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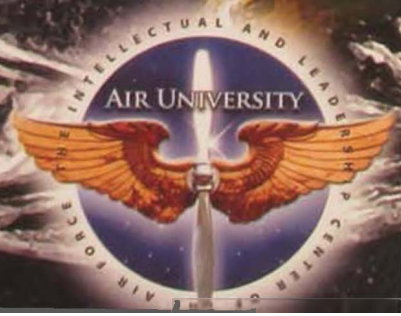
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TO FLY TO FLY, FIGHT, AND WIN ... IN AIR, SPACE, AND CYBERSPACE



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Lichte on Leadership

A Yankees Fan's Perspective

GEN ARTHUR J. LICHTER, USAF*



AS A STUDENT of leadership over the past 37 years, I've received numerous briefings and read countless works on the subject. I quickly found out that the range of different perspectives rivaled the number of works themselves. Not surprisingly, I discovered that some perspectives resonated with me more than others, and with that as a foundation, I began forming my own thoughts on leadership.

As a child, I grew up with my house just blocks away from Yankee Stadium, "the house that Ruth built." So naturally, I became (and remain) an avid Yankees fan. As I joined the service and learned more over the years, I began to see similarities between

my beloved Yankees and our great Air Force. I quickly found out that there's some real wisdom and hidden insights waiting to be discovered by those who spend even a little time and effort looking at both of these championship organizations. But before we jump into the specifics, let's take a brief look at some of the similarities between the Yankees and the Air Force.

Similarities between the Yankees and the Air Force

It may not appear so on the surface, but our Air Force and the New York Yankees have

*The author was born and raised in the Bronx, New York, where he graduated from Cardinal Spellman High School and Manhattan College before earning his commission in the US Air Force.

many things in common, namely, their origins, winning traditions, and incredible people. The Yankees, for instance, started as the Baltimore Orioles, just as the Air Force found its origins in the Army Air Corps. A Yankees fan wants to see his team win all 162 games by a score of 10–0, a goal we share in the Air Force . . . we never want a close fight. And it's the great leaders and superstar players in both organizations that have given us our amazing successes to date.

The Yankees can look to Casey Stengel, Ralph Houk, Joe Torre, and of course Yogi Berra as their great leaders. Their leadership, combined with superstar players such as Babe Ruth, Joe DiMaggio, Mickey Mantle, and Derek Jeter, produced a record-setting 26 World Series titles to date, and enabled them to win more World Series games (130) than any other team has even played. The Yankees are the perfect example of what happens when leadership and talent intersect.

The Air Force is the same. We have been fortunate to have great leaders such as Gen Ron Fogleman, Gen Mike Ryan, Gen John Jumper, and Gen Michael "Buzz" Moseley, reaching all the way back to Brig Gen Billy Mitchell. Together with superstars such as Capt Eddie Rickenbacker, Maj Dick Bong, Capt Lance Sijan, and Sgt John Levitow, US airpower has played an ever-increasing role in ensuring our nation's success in conflict. All in all, our forefathers' collective efforts have paid off in recruiting, developing, and retaining the outstanding Airmen who serve as the core of our superstar team, ultimately resulting in our service becoming the most respected air and space force in the world today. Leadership and talent intersect yet again.

So the parallels are there. Growing up in the shadows of Yankee Stadium, I had the good fortune of seeing Yogi Berra in action and found a number of his famous sayings not only fun but also insightful from a leadership perspective. I'd like to use some of those sayings as starting points to share my thoughts on leadership.

"When You Come to a Fork in the Road, Take It"

Decisions are a fact of life, no matter what we do or where we go. Those of you in uniform made a conscious decision to raise your hand and serve—and for that, I applaud and thank you. Military service opens many doors for us, but we have to be receptive to the opportunities that come our way. So I encourage you to push your boundaries and branch out into the uncomfortable unknown. Don't be afraid to take risks and learn from your mistakes. Above all, resist the temptation to become so fixated on seeking a particular job or assignment that you miss out on the opportunities right there in front of you. The key to success is realizing that the job you have today is the most important one you'll ever have—so run with it with zeal and enthusiasm.

When I was a captain coming up for an assignment, I was flying KC-135s at Plattsburgh Air Force Base, New York, and I really wanted to cross-train to the Air Force's newest air refueler, the KC-10. The Air Force, however, had other plans, sending me to what was then Strategic Air Command as a personnel officer. As a young pilot, I didn't know a thing about the personnel system, but I went with a positive attitude and consequently learned a great many things. Though I couldn't have foreseen it at the time, the assignment gave me a foundation in our personnel system that I still use. Just as importantly, though, I leaned heavily on that knowledge during my next assignment, when I not only cross-trained to KC-10s but was entrusted to command a squadron of them!

"We Have a Good Time Together Even When We Are Not Together"

Yogi's talking about family members here, and it's important to remember that they too should play a significant part in dealing with the "forks in the road" you encounter throughout your career. Despite what many of us may

want, we can wear the uniform for only so long. Your goal should be to have your family with you when you leave the service. I simply can't overstress the importance of family. When I say "family," I'm not just talking about our husbands, wives, and children but our parents and siblings too. Make a concerted effort to stay in touch and have fun, even while you're forward-deployed—don't leave it to chance. Take advantage of technology and use the Internet (e-mail, etc.) to remain close to your loved ones despite physical separation. If you're just going on a short tour of duty, don't underestimate the power of souvenirs. As the years go by, those items will not only serve as warm reminders of your travels, but, more importantly, they'll stand as a testament to your ongoing love of your family.

"Public Speaking Is One of the Best Things I Hate"

Communication is crucial to the success of any project, organization, or individual leader, and the ability to speak publicly is critical for Airmen of all ranks. Develop this skill early on, and seek out opportunities to speak in front of groups. Understand that the vast majority of us start out feeling uncomfortable, and accept that those of us who are comfortable have likely gotten that way by repeatedly placing ourselves in front of groups and speaking. The best advice I can give is to be yourself, talk from the heart, and be honest—that's how you'll convince and inspire others. In doing so, as I've found, you'll soon realize the power behind public speaking, and you'll cherish the skill as a key tool to ensure not only your success but also—and more importantly—that of your organization.

"[He's] Learning Me All His Experience"

Just as public speaking is a critical leadership skill, so is technical expertise and proficiency. Take training seriously, and ensure that you carve out the time necessary to stay

up to date on the latest tactics, techniques, and procedures. This is a technical, complex business we're in, and the cost of failure is measured not in dollars but in lives. We've been at war for over 17 years now, and the stress of the operations tempo, coupled with the transformation of our service to a lighter, leaner, and more efficient organization, demands our continued focus on training.

Mentorship is no different, and we're never too young to give it or too old to receive it. Great mentoring doesn't always have to do with work, and it doesn't always have to be pleasant either. Good mentors are candid in their suggestions (positive and negative), and I encourage you to seek out constructive feedback (even if it stings a bit) so you can learn and grow. Similarly, be open and honest when others seek your opinion. We all have areas in which we can improve.

Finally, make an effort to broaden the "circle of friends" to and from whom you give and receive advice. As a personal example, shortly after I arrived on station as a second lieutenant, my squadron operations officer invited me to his house for a cookout. We had a great time, and just before I left, I asked if he would come to my place in return. He thanked me for offering but asked that I invite someone else instead—someone new to the base. What a great idea! It's one that has stuck with me ever since. I've made some really good friends through my assignments just by opening doors to new arrivals, and I in turn have encouraged them to do the same.

"If You Don't Have a Bullpen, You Got Nothing"

Teamwork, teamwork, teamwork. That's what enables the Air Force to do the amazing things it does. It's not a place for individuals who look out for themselves or place their own interests above the service's. As President Kennedy said, "Ask not what your country can do for you—ask what you can do for your country." We should take those words to heart. Back up your fellow Airmen, and recognize that every individual plays a vital role in the

success of our Air Force mission. By helping each other, we not only help the Air Force accomplish its mission but also benefit personally from the experience by strengthening the bonds of camaraderie and further expanding our understanding of Air Force operations.

“You Can’t Win All the Time— There Are Guys Out There Better Than You”

Although a positive character trait, humility is a hard pill to swallow at times. Our Air Force is fortunate to have so many great people who are motivated to succeed. That said, it’s simply reality that everyone can’t be “number one” in everything. The Air Force finds itself in the enviable position of having to struggle to identify a select few for early promotion or in-residence schooling, because the pool is extremely competitive. Accepting this fact underscores the importance of stratification* and requires us to accept the responsibility of looking our Airmen in the eye and making the hard call. If we don’t do it as raters, selection boards will be forced to treat our people as equals and rank all of them behind their stratified peers.

As ratees, it’s our duty to remain humble among our peers while striving continually to improve ourselves. As leaders, it’s our duty to stratify our superstars, candidly tell our Airmen where they rack and stack, and consistently provide everyone with quality feedback, identifying areas in which they excel and those in which they can improve.

“If You Don’t Know Where You Are Going, You Might Not Get There”

As I mentioned under the first Yogi saying, we need to make the most of the opportunities the Air Force gives us. But the reverse is

also true—we should ensure that opportunities don’t pass us by because of something we failed to do. Developmental education (DE) and academic degrees, for example, are known yardsticks by which we’re measured. So be sure that you take the time to do these things at appropriate stages in your career. Additionally, start thinking about learning a foreign language—a great advantage in today’s coalition environment.

After you’ve met your school and DE requirements, focus on those people one rank senior to you, and start learning how they lead personnel, motivate others, prioritize efforts, and allocate resources. You will be in their position sooner than you think. If you’re a lieutenant, don’t try taking on the duties of a colonel—that’s simply a bridge too far. Instead, focus on the next-higher rung, and study the captains around you. By doing so, you will learn to think and lead like your boss, who will gain someone (you) who inherently knows what he or she needs.

“You Can Observe a Lot by Watching”

You have an opportunity every day to observe your boss and your organization’s leaders. Don’t waste it. Take note of the traits you find effective, and incorporate the best into your set of skills. Conversely, be aware that you too are being watched. Take care of your appearance, from haircuts to uniform wear to the cleanliness of your workplace. Take pride in your work, and raise the bar by setting a positive example. You’ll find that your colleagues will emulate you—so make sure it’s for the better, not worse. Your paths will cross again someday, and when they do (believe me, they will), you’ll be grateful that your positive example helped propel them to success and that their example helped you develop as well.

*Stratification is the sequential, numerical ranking of an organization’s members according to their perceived ability to serve in the next-higher grade. Persons of a given rank are stratified only against others in the organization of the same rank (e.g., my number two captain of five).

For those who think that your paths won't cross, let me tell you a quick story. I was a lieutenant colonel in the Pentagon back in 1990, working for Gen Robert Rutherford, a combat air forces (CAF) pilot. At the time, General Fogleman, another CAF pilot, also worked for General Rutherford. I clearly remember thinking to myself that since I was a mobility air forces pilot, our paths would never cross again. Well, as fate would have it, General Fogleman was selected to take over the newly established Air Mobility Command (AMC), and the next thing I knew, I was his executive officer! What's more, after General Fogleman became the Air Force chief of staff, he picked General Rutherford as his replacement at AMC. So in the end, I worked for both of them! The moral of the story is to always do your best, look for great leadership traits, and anticipate the time when your paths will cross again.

“We Made Too Many Wrong Mistakes”

In the mid-to-late 1990s, service members shared a concern that their Air Force was evolving into a one-mistake service. I believe we've moved beyond that misperception—and that's a good thing. As humans, we're going to make mistakes, and I've found that, more often than not, that's how we really learn. As I said earlier, I encourage you to step outside your comfort zone and try new things. Good leaders accept the fact that their people will make mistakes, but they also do their best to minimize the pain associated with the learning process.

In fact, most mistakes and potential pitfalls can be easily prevented. Often, a series of questions will bring such problems to light. Despite our best intentions, though, sometimes we simply don't ask enough questions.

A perfect example comes from one of my own changes of command. One of my unit's captains, whom I'd directed to run the ceremony, informed me that he had arranged to have someone sing the national anthem. Asked if he had heard the individual sing, he

admitted he hadn't. However, after he attended the person's church and reported that the singer had a wonderful voice, I considered the matter resolved. On the day of the ceremony, the narrator asked the audience to please stand for the arrival of the official party, posting of the colors, and singing of the national anthem. Well, just as the color guard took its first step, the singer began in a great, deep voice, sounding marvelous—only two minutes too early. The color guard still stood in the back of the room! Well schooled in drill and ceremony, its members stopped in their tracks and presented the colors—in the back of the room. Realizing that something wasn't quite right, the singer became distracted but continued the anthem—and, in going from bad to worse, he began mixing up the words! It was all the audience could do to contain itself until he finally belted out, “Pilgrims bursting in air!” at which point everyone burst out laughing. Somehow we got through it, but it just goes to show you there is no such thing as a “dumb” question—I never asked the captain if our guest had ever sung in an official Air Force ceremony.

But I don't want to leave this point without distinguishing between making mistakes and breaking the law. People who choose to use illegal narcotics or drive under the influence clearly don't make a mistake—they break the law. We in uniform place our very lives in each other's hands and therefore cannot tolerate any such disregard for the health and safety of our fellow wingmen.

“There's Always Some Kid Who May Be Seeing Me for the First or Last Time—I Owe Him My Best”

Okay, for my fellow Yogi fans out there, he didn't actually say this one. Rather, Yogi heard it from Joe DiMaggio when DiMaggio, one of the senior players on the team, gave Yogi an earful for choosing to sit out the second game of a doubleheader. The message here is simple: people are watching us all the time, so as representatives of our Air Force team, we have a responsibility to give them our best.

As you meet people at home or abroad, on duty or on leave, it's quite possible that you may be the only person in the armed forces they come across in their entire lives. Though an intimidating possibility, it also presents a great opportunity. Just be yourself, and don't be afraid to tell them about all the great places you've been and the great things you've done. I've found that Americans and their international partners respect our men and women in uniform, and I believe they deserve the opportunity to meet them face to face, shake their hands, and thank them for their service.

"The Future Ain't What It Used to Be"

This was true when Yogi said it, and it's even truer today. When I was commissioned back in 1971, the global positioning system (GPS) wasn't even in development, much less operational. Today it serves not only as a primary means of navigation but also as a critical piece of our targeting and ordnance-delivery systems. Such capabilities as the GPS and Global Information Grid, both of which operate in the new cyberspace domain, enable us to see a target anywhere on the face of the earth, track it, hold it at risk, and present viable options to our president.

The same technology has also improved our quality of life. Gone are the days when we had to take our records with us to the finance office in order to collect a paycheck. Gone are the days when we had to walk over to the personnel office to obtain a copy of our performance report. We're at a point now where there is little that we can't do online. Airmen have leveraged technology to make things better, and the efficiencies we've gained help to generate cost savings that we can put towards modernizing and recapitalizing our fleet.

But leveraging cyberspace is a double-edged sword. On the one hand, it promises improvements in every area—operations, maintenance, support, and quality of life. On the other, it brings out a certain amount of built-in resistance to the change it produces—resistance that threatens the benefits before they're

even delivered. Our task as leaders is to lead through the cultural change and push the envelope, to foster and encourage the culture of innovation, to break through the culture of resistance—and ultimately continue to make the Air Force even better than it is today.

"Always Go to Other People's Funerals—Otherwise, They Won't Go to Yours"

On opening day in Yankee Stadium, a ceremony recognizes former Yankees who have passed away since the prior season. During one such tribute, Yogi said, "I hope I never see my name on that list." Like many of Yogi's sayings, it makes us chuckle, but the point is that we should show our support for others—not only because it's the right thing to do, but because we'd like others to support us too. I'm talking about everything from promotion and retirement ceremonies to unit intramurals, picnics, and hails and farewells. Sure, naysayers will always want us to think that it won't be any fun, but in my experience, people who go to these events have a great time and learn something.

For the officers out there, you need to start thinking about the day you'll officiate at those ceremonies. Believe me, when the first time comes around, you'll wish you had attended a few more and paid attention. It will come sooner than you think. You may believe that only squadron commanders officiate at retirements, but every once in a while, you'll see a second lieutenant retire a senior noncommissioned officer with over 20 years of service. It just goes to show you that it's never too early to start taking notes.

In addition to supporting your unit, you should also get involved in professional organizations such as the Air Force Association, the Airlift/Tanker Association, or other entities specific to career fields. These organizations provide ample opportunity to broaden your horizons as well as network and meet people. The relationships you'll foster in those forums will open doors that otherwise would have remained closed to you.

“I’d Rather Be the Yankee Catcher than the President”

Yogi spent 18 years as catcher for the Yankees, and this statement clearly shows that he loved every moment of it. For me, it’s my Air Force career. I just can’t imagine feeling more fulfilled or happier in any other occupation. And you should be happy and proud of what you’re doing because if you think of your job as the best in the world, then it will hardly seem like work!

There simply hasn’t been a better time to be in our service. We’re the most combat-ready and combat-tested air force in history! When you go home, tell your family and friends what you’ve done and where you’ve been. Tell them about the places they’ve only heard about. You have an incredible story to tell, and all too often people back home don’t understand how engaged we are in the fight. Airmen are making a difference and are saving lives every day, so go ahead and brag on yourself a little. You’ve earned it!

“It Ain’t Over ’til It’s Over”

So there you have it—a Yankees fan’s perspective on leadership. I hope you’ve gathered some food for thought and smiled along the way. Leadership is a challenge, no doubt about it. But that’s part of what makes it fun, interesting, and worthwhile. This really is a great time to serve our country, and I applaud everyone who has answered this noble calling. Regardless of whether you serve for four years or 40, the experience will forever change you, and America will always be grateful. So get out there, keep doing the incredible things you do every day, and continue to lead. And while you’re at it, don’t forget to treat your family to a day at the ballpark every now and then. As for me, I already have tickets to check out the new Yankee Stadium in 2009. So if a Yankees game is on your calendar, keep an eye out—I just might see you there! □

Global Vigilance, Global Reach, and Global Power constitute America’s edge—America’s asymmetric advantage that shapes the global security environment.

—Air Force Posture Statement 2008



Global Vigilance, Reach, and Power

THE US AIR Force has long characterized its mission in global terms. Gen Hap Arnold chose *Global Mission* for the title of his memoirs, published in 1949. An Air Force white paper of 1990, *Global Reach—Global Power*, articulated a vision of how the service would contribute to national defense in a changing world. Five years later, *Global Presence* appeared, followed soon thereafter by yet another Air Force publication, *Global Engagement*.

More recently, “global vigilance” joined the legacy notions of global reach and global power to form a conceptual trio. The Air Force defines *global vigilance* as “the persistent, worldwide capability to keep an unblinking eye on any entity—to provide warning on capabilities and intentions, as well as identify needs and opportunities”; *global reach* as “the ability to move, supply, or position assets—with unrivaled velocity and precision—anywhere on the planet”; and *global power* as “the ability to hold at risk or strike any target, anywhere in the world, and project swift, decisive, precise effects.”¹

At first glance, these three terms appear to coherently encapsulate the service’s diverse mission areas and serve as building blocks of strategy, but they have partially devolved into slogans that Air Force major commands exploit to advocate their programs. Specifically, Air Force Space Command has become associated with global vigilance, Air Mobility Command with global reach, and Air Combat Command with global power. Such interpretations ill suit an Air Force dedicated to integrated air, space, and cyber activities. In effect, something intended to serve as a unifying vision of what the service contributes to national defense has split into narrower, command-centric concepts.²

Defense analysts at the Air Force Research Institute propose redefining the concepts to restore their visionary nature, anchoring global

vigilance to the concept of “situational awareness” and making it the foundation of the other two concepts. The new global vigilance not only encompasses data-gathering and assessment activities that enable global power, but also relies on global reach to gather and transmit the resulting information to facilitate situational awareness. Global reach becomes “operational access,” which comes from establishing connectivity throughout the air, space, and cyber domains. Such connectivity depends upon both global vigilance and global power to exercise the requisite degree of control over the relevant domains. The analysts redefine *global power* as the “ability to create and sustain effects” of all kinds in each of the Air Force’s operational domains, an ability based upon global vigilance and global reach. They also reinforce the existing trio by proposing an underlying “global partnering” foundation that would enable the other three concepts as well as reflect the importance of long-term military cooperation with other nations.³

Whether these reformulated ideas crystallize into a more holistic vision of air, space, and cyber power remains to be seen, but, without question, Airmen will continue to debate these complex topics. *Air and Space Power Journal*, the professional journal of the Air Force, dedicates this issue to promoting dialogue about global vigilance, reach, and power. □

Notes

1. Gen T. Michael Moseley, *The Nation’s Guardians: America’s 21st Century Air Force*, CSAF White Paper (Washington, DC: Department of the Air Force, Office of the Chief of Staff, 29 December 2007), 1, <http://www.af.mil/shared/media/document/AFD-080207-048.pdf>.

2. I am indebted to a number of colleagues at the Air Force Research Institute who developed this idea while conducting the chief of staff’s Air Force Strategy Study during 2008.

3. *Ibid.*



Honoring Maj Gen I. B. Holley for His Many Years of Service to *Air and Space Power Journal*

MAJ GEN I. B. Holley has announced his retirement from *Air and Space Power Journal's* (ASPJ) Editorial Advisory Board (EAB—its board of directors, charged with determining the *Journal's* strategic direction). A military-history icon, he has been associated with ASPJ for over three decades—actually only a small part of his amazing military and academic career. After enlisting in the Army Air Forces and serving as an aerial-gunnery instructor during World War II, he joined the Air Force Reserve in 1947. In the military, he served in the Office of the Secretary of the Air Force, at the Keesler Technical Training Center in Mississippi, and at Maxwell Air Force Base, Alabama, as mobilization designee to the commander of Air University. By 1976 his talents had taken him to the rank of major general; he retired from the Air Force Reserve in 1981. Meanwhile, for over 60 years he has enjoyed a parallel career as a professor at Duke University, teaching a number of subjects, including military history and the history of technology.

General Holley is renowned for his keen insights into how thought affects military organizations and the conduct of war. His landmark book *Ideas and Weapons*, published in 1953, analyzes the evolution of weaponry between World War I and World War II, notably in terms of the influence of doctrine upon airpower development. He has published other books and innumerable articles, some of which

have appeared in ASPJ (formerly known as *Air University Quarterly Review*, *Air University Review*, *Airpower Journal*, and *Aerospace Power Journal*). The Air Force Historical Foundation recently honored him by establishing the Major General I. B. Holley Award to honor scholars who have made “a sustained, significant contribution to the documentation of Air Force history during a lifetime of service.” The inaugural award went to General Holley for his “decades of assistance, support and encouragement to military historians.”*

Nobody will ever fully comprehend all the ways that General Holley has contributed to ASPJ, but his pervasive influence is ingrained in the *Journal's* DNA. I first met General Holley over 10 years ago, when he taught a short course on research and writing at Air University. His crisp, no-nonsense, highly demanding teaching style left a lasting impression. Since then, I have hosted him at EAB meetings, during which I have done my best to profit from his wisdom. He periodically sends notes to the ASPJ staff, offering witty advice and constructive criticism. Fellow EAB member Dr. Dave Mets has known General Holley much longer, having met him at the Air Force Academy in the 1960s. Dr. Mets served with General Holley on the West Point faculty in the early 1970s, benefited from his mentoring during Dr. Mets's tenure as editor of *Air University Review* in the late 1970s, and again while assigned as a professor at the School of

*“Major General I. B. Holley Award,” Air Force Historical Foundation, 2008, http://www.afhistoricalfoundation.org/awards/Major_General_I_B_Holley_Award.asp

Advanced Air and Space Studies at Maxwell in the 1990s. Dr. Mets told me that General Holley "has ever been an inspiration as well as perhaps my greatest teacher, but most of all a dear friend. He has been a stalwart pillar

supporting this journal and the Air Force as long as both have existed."

On behalf of the *ASPJ* staff, past and present, I thank General Holley for his many years of dedication to the *Journal's* ongoing mission. □



Ricochets and Replies

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

AIRPOWER IMBALANCE

Air Commodore Tariq Mahmud Ashraf's article "Airpower Imbalance: Nuclear Pakistan's Achilles' Heel" (Fall 2008) is intriguing. However, the points that he chooses not to address are extremely disturbing. Specifically, what is the definition of "economic strangling" (p. 15)? If India continues its economic development and becomes an even stronger regional economic power, would that constitute economic strangling? Also, is Pakistan saying that if domestic destabilization occurs, it could opt to use nuclear weapons against India? How can a government prove that a foreign government (India) is the cause of internal problems? Is there a threshold?

Lt Col Guillermo R. Gonzalez, USAF
Fairfax, Virginia

AIRPOWER IMBALANCE: THE AUTHOR RESPONDS

Pakistan has had only one main seaport at Karachi, and although it has been supplemented somewhat by the construction of Port Qasim and the Gwadar Port, India's blue-water-capable navy could still attempt to choke Pakistan's principal shipping routes. Once

again, the limited range of the Pakistan Air Force's aircraft precludes Pakistan's ability to break any such naval blockade. Considering that all critical resources, including petroleum, are brought into Pakistan by sea, a sea-based economic blockade could have a crippling effect on Pakistan's war potential.

Meddling in each other's domestic activities has been a hallmark of both the Indian and Pakistani foreign intelligence agencies. Lately, India's extensive inroads into Afghanistan, support to insurgent elements in Baluchistan, and attempts to foment dissent amongst the Pashtuns have been disturbing developments. Although it would take a lot for India to really be able to create domestic instability severe enough to threaten the very existence of Pakistan as a nation-state, the possibility does exist and cannot be eliminated. In the remote case in which suspected Indian interference in the domestic affairs of Pakistan reaches a level where the eventual breakup of the nation appears possible, Pakistani recourse to the nuclear option cannot and should not be ruled out.

Air Commodore Tariq Mahmud Ashraf,
Pakistan Air Force, Retired
Al Ain, United Arab Emirates

STRATEGY AND COST

I really enjoyed Lt Col Lawrence Spinetta's article "Strategy and Cost: A Gap in Our Military Decision-Making Process" (Fall 2008). Last year, while attending the Army's Command and General Staff College, I came to the same realization as Colonel Spinetta that cost—and economics in general—did not figure into the discussion during the military decision-making process. Even with our increased focus on information operations and stability operations, we don't seem to consider cost and economic incentives as carefully as we should. As a comptroller and economist, I find that a bit disturbing.

Maj John C. Hansen, USAF
Laughlin AFB, Texas

THE ROLE OF AIR FORCE CIVIL ENGINEERS IN COUNTERINSURGENCY

Lt Col Kendall Brown's article "The Role of Air Force Civil Engineers in Counterinsurgency Operations" (Summer 2008) does a wonderful job of outlining the capabilities of Air Force civil engineers (CE) and the ways they have been effectively employed. However, there is a strategic component of our CE force structure that he does not address—the Prime Base Engineer Emergency Force (Prime BEEF) Staff Augmentation Team (S-Team). These teams complement Prime BEEF and the Rapid Engineer Deployable Heavy Operations Repair Squadron, Engineers (RED HORSE) to complete the Air Force's CE triad. The S-Teams exist only in the Air Reserve Component but have played an important role in supporting combatant commanders' engineering needs in-theater since 11 September 2001. In fact, the S-Team capability is expanding. The Air National Guard is currently adding two new units in response to the demand.

Lt Col Mike Ray, North Carolina Air National Guard
Charlotte, North Carolina

LORENZ ON LEADERSHIP

The articles "Lorenz on Leadership" (Summer 2005) and "Lorenz on Leadership: Part 2" (Spring 2008) by Gen Stephen Lorenz are superb, and I hope to see a third article or even a book. I had the great personal honor of sitting in the front row at Officer Training School at Maxwell AFB, Alabama, when General Lorenz briefed us on leadership during my Air Force ROTC field training this summer. I definitely share his taste for the study of leadership.

I liked how General Lorenz used quotations from prominent historical figures. Those statements were a great touch and helped me grasp the thought process behind leadership principles. With respect to the general's experiences as a student, I find myself in the same boat, which is why I appreciated the quotations from Winston Churchill. The real-world examples were also helpful to an aspiring leader like me. The principles are easier to apply when they come from a story that is easy to remember. I have noticed that when I follow General Lorenz's advice and ask people how they are doing three times in a row, they answer sincerely and not halfheartedly. This is a great asset to a leader's assessment of his or her people.

After reading the general's articles and digesting the briefing he gave, I do wonder about a couple of things. First, the author mentions his time at the Air Force Academy as a cadet who earned less-than-perfect grades. It is humorous that he is now in charge of all Air Force education, but I'd like to know how he drew the inspiration to excel after he graduated from the academy. What caused the change? Second, during his briefing, General Lorenz said that the four things that get people in trouble are drugs, sex, alcohol, and money. Afterwards, all of us cadets and our Air Force officer mentors discussed that point extensively, and we generally agreed with what he said. I wonder why General Lorenz did not include those four things in his articles. I think that writing about them would help

some readers. Maybe he could include that discussion in a future article.

The leadership principles presented by General Lorenz have made a profound impact on my life. Add my name to the long list of people whose lives he has influenced.

Cadet Matthew D. Dunlevy, Air Force ROTC
University of North Dakota
Grand Forks, North Dakota

LORENZ ON LEADERSHIP: PART 2

"Lorenz on Leadership: Part 2" (Spring 2008) is a fantastic article. It not only tells about the art of leading servicemen but also radiates humaneness. Military leaders should manifest themselves as seniors because "you truly never know when you are going to make a difference" (p. 12). Leading one's men in battle certainly inspires awe and respect but not necessarily love and affinity. Those things can be gained more often through warm caring about routine details. This reminds me of the tradition of the Chinese People's Liberation Army (PLA) that advocates communication and unity through "heart-to-heart" private talks between supervisors and subordinates. When nostalgic holidays come, senior leaders will travel to remote company and platoon barracks, dining and chatting with soldiers to learn about their concerns. This way, the PLA successfully maintains servicemen's loyalty and the force's power.

Wang Zhibo
Beijing, China

Editor's Note: Lieutenant General Lorenz was recently promoted to the rank of four-star general. Mr. Wang read the Chinese version of his article at <http://www.airpower.maxwell.af.mil/apjinternational/apj-c/2008/sum08/Lorenz.htm>.

AIRPOWER'S CRUCIAL ROLE IN IRREGULAR WARFARE

I very much enjoyed both the Chinese and English versions of Maj Gen Allen G. Peck's article "Airpower's Crucial Role in Irregular Warfare" (Summer 2007). I admired the au-

thor's broad experience in operational airpower and enjoyed the wisdom reflected between the lines of his article. He accurately defined irregular warfare (IW) as including "counterinsurgency operations and foreign internal defense (FID)" (p. 10) and pointed out its effect on Air Force development as well as its roles in future wars. Many students who are now junior officers taking language courses here at the Defense Language Institute will participate in FID operations in Iraq or Afghanistan. Such IW experience will broaden their field of vision, sharpen their war-fighting skills, and enable them to know themselves and their opponents better. These junior officers "may well be responsible for the strategic aspects of tomorrow's war" (p. 11). The general's article therefore serves as good reading material for our language students—the warriors of current and future IWs.

Zhao Luyuan
Defense Language Institute
Monterey, California

Editor's Note: Major General Peck was recently promoted to the rank of lieutenant general. The Chinese version of his article is available at <http://www.airpower.maxwell.af.mil/apjinternational/apj-c/2008/spr08/Peck.htm>.

LEAN UNIFORMS: CUTTING THE "WASTE" LINE

I enjoyed the article "Lean Uniforms: Cutting the 'Waste' Line" by Lt Gen Terry Gabreski, Maj Gen Loren Reno, and Brig Gen Robert Allardice (Spring 2007). It introduced new concepts of uniform design to us in Iraq. If the article's concepts were studied and tested, it might be feasible for the new Iraqi military to adopt them.

Staff Maj Gen Qaa'id K. M. Al-Khuzaa'i, Iraqi Air Force
Baghdad, Iraq

Editor's Note: General Al-Khuzaa'i read the Arabic version of that article at <http://www.airpower.maxwell.af.mil/apjinternational/apj-a/2007/win07/gabreski.pdf>.

The Merge

In air combat, "the merge" occurs when opposing aircraft meet and pass each other. Then they usually "mix it up." In a similar spirit, Air and Space Power Journal's "Merge" articles present contending ideas. Readers are free to join the intellectual battlespace. Please send comments to aspj@maxwell.af.mil or cadreaspj@aol.com.

Reply to "A Look down the Slippery Slope: Domestic Operations, Outsourcing, and the Erosion of Military Culture"

JOHN R. LEIBROCK*

MAJ BRYAN D. Watson's article "A Look down the Slippery Slope" (*Air and Space Power Journal*, Spring 2008) should be required reading for every military commander, contracting officer, and support-function service member who looks only for the cheap way of meeting the mission. People other than legal staff members such as Major Watson need to know, appreciate, and write about the danger. The article should also be read by our elected officials who put us on this "slippery slope" to begin with, when they opted for the all-volunteer force because it was politically expedient. This force was just the first step toward our society's current acceptance of the commercialization of national defense.

Traditionally the US military culture about which Major Watson writes has consisted not only of a core cadre of "professional" military personnel with traditions and customs, but also of a generous complement of individuals from all segments of our society. That sometimes contentious mixture kept the military in touch with society's values—and engendered the trust and confidence of the citizenry. I do not want to disparage members of the all-volunteer force. They are, I believe, compe-

tent, well-trained military men and women who believe in the armed defense of our country. But they also comprise a decreasingly representative cross section of our society. More and more, military service is viewed either as a purely financial decision or as a business/professional pursuit—but not as a societal obligation to be borne in some manner by all members of our society.

If our military leaders are brutally honest with themselves, they should recognize that the all-volunteer force was the first embrace of the "let's hire our self-defense" approach. Once we accept that notion, contracting out our national defense does not seem too radical. US business has a long history of making money by supplying the military with defense hardware. A democracy grounded in capitalism can tolerate that, but it will not survive business's providing the "man and woman power" of defense. Our uniformed services should be populated with strong, independent, patriotic citizens loyal to the ideals of their country—not to the bottom-line deals of their company (or, in the worst-case scenario, the belief that the military knows what is best for the country).

*The author is a retired Air Force reservist, an attorney, a labor-relations adviser, and a citizen concerned about the willingness of our society to defend itself and its basic principles.

Major Watson, a judge advocate, used the phrase "slippery slope" to describe what has happened or will happen to our military culture. Another device, the "parade of horrors," is often used in arguments before a court to describe what could happen in the future if some course of conduct is not reversed. My parade of horrors is this: Because of ill-advised military entanglements, the country loses its commitment to personal military service. Requiring universal military service is politically untenable, so the country goes commercial by increasing monetary incentives to join the service, calling it all-volunteer. But that gets very expensive, so the politicians hide the costs by drawing down the uniformed force and hiring contractors to do the jobs. That is still too expensive and the population

is complacent, so, what the heck, we just hire mercenaries. Even cheaper and more motivated, they will be honest, loyal, devoted defenders of our democratic liberties, won't they? We are, after all, paying them good wages. And we can all just sit on our entitlements to a safe and free society while our heavily armed hired help happily fights and dies for us, right? If we as a society won't require sacrifice of ourselves, then we are already sacrificing ourselves to the next motivated and determined authority.

In my opinion, a society is best served and defended from both external and internal military dangers by armed forces that consist of members from all strata of that society. □

Randolph AFB, Texas

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Comments on “Weather and the Calculated Risk”

COL BOB GLAHN, USAF, RETIRED*

I WAS VERY PLEASED to see Maj Anthony Eckel, Capt Jeffrey Cunningham, and Maj Dale Hetke’s article “Weather and the Calculated Risk: Exploiting Forecast Uncertainty for Operational Risk Management” (*Air and Space Power Journal*, Spring 2008). I am a strong proponent of probability forecasting, mainly for the reasons given in that article. Most decisions are based on incomplete information, and a great many depend on weather. If we can quantify the uncertainties and know the risks, we can base decisions on decision theory concepts.

Probability forecasting is not new. Cleveland Abbe, who helped establish the Weather Bureau (now the National Weather Service [NWS]), was called “Old Probabilities.” Decision theory was also known early on, and I published “The Use of Decision Theory in Meteorology with an Application to Aviation Weather” in *Monthly Weather Review* in 1964. The Weather Bureau established a national program of forecasting the probability of precipitation in 1966. Unfortunately, progress in probability forecasting has been excruciatingly slow.

However, there is now renewed interest in probability forecasting. The National Research Council recently issued a report on the topic, *Completing the Forecast: Characterizing and Communicating Uncertainty for Better Decisions Using Weather and Climate Forecasts*, that was sponsored by the NWS.¹ Partly in response to that report, the American Meteorological Society has established an Ad Hoc Committee on Uncertainty in Forecasts. Many scientists from various walks of life are participating to help identify better ways of addressing forecast-uncertainty

products, services, and the nation’s information needs.

The increased interest has been fostered by the computer power now available to address uncertainty in the numerical weather-prediction process. Ensembles of model runs exhibit the uncertainty attributed to incompletely known initial conditions and inadequately modeled atmospheric processes. These ensembles produce a distribution of weather variables of interest. Characteristically, however, the ensembles are underdispersed; that is, they do not cover the full range of possibilities. For probabilistic forecasts to be useful in formal decision processes, they must be reliable. That is, if the probability of an event is forecast to be 20 percent on many occasions, then the event should occur on about 20 percent of those occasions. If that is not true and the user has no way to make them reliable, then the use of the probabilities may do more harm than good.² Even though the ensembles do not produce reliable probabilities, their output can be post-processed statistically to provide reliable and more skillful forecasts. Such postprocessed forecasts from the NWS’s Global Forecast System will soon be in the National Digital Guidance Database, which is interoperable with the National Digital Forecast Database.³

The future is brighter than ever before since we can now make informed operational decisions by applying risk-management principles; however, as Eckel, Cunningham, and Hetke state, the shift to rigorous use of probability forecasts in decision models will not occur overnight. The process will be gradual, but we will make progress. □

Silver Spring, Maryland

*The author is director of the Meteorological Development Laboratory, National Weather Service.

Notes

1. National Research Council, *Completing the Forecast: Characterizing and Communicating Uncertainty for Better Decisions Using Weather and Climate Forecasts* (Washington, DC: National Academies Press, 2006).

2. Allan H. Murphy, "The Value of Climatological, Categorical and Probabilistic Forecasts in the Cost-Loss Ratio Situation," *Monthly Weather Review* 105, no. 7 (July

1977): 803-16, <http://ams.allenpress.com/archive/1520-0493/105/7/pdf/i1520-0493-105-7-803.pdf>.

3. Harry R. Glahn and David P. Ruth, "The New Digital Forecast Database of the National Weather Service," *Bulletin of the American Meteorological Society* 84, no. 2 (February 2003): 195-201, <http://ams.allenpress.com/archive/1520-0477/84/2/pdf/i1520-0477-84-2-195.pdf>.

THE AIRMAN'S CREED

I AM AN AMERICAN AIRMAN. I AM A WARRIOR. I HAVE ANSWERED MY NATION'S CALL.

I AM AN AMERICAN AIRMAN. MY MISSION IS TO FLY, FIGHT, AND WIN. I AM FAITHFUL TO A PROUD HERITAGE, A TRADITION OF HONOR, AND A LEGACY OF VALOR.

I AM AN AMERICAN AIRMAN, GUARDIAN OF FREEDOM AND JUSTICE, MY NATION'S SWORD AND SHIELD, ITS SENTRY AND AVENGER. I DEFEND MY COUNTRY WITH MY LIFE.

I AM AN AMERICAN AIRMAN: WINGMAN, LEADER, WARRIOR. I WILL NEVER LEAVE AN AIRMAN BEHIND, I WILL NEVER FALTER, AND I WILL NOT FAIL.

Reply to “Military Transformation: Ends, Ways, and Means”

MR. BENOÎT DRION*

I DO NOT INTEND to make a complete commentary on Dr. Jack D. Kem’s very interesting article “Military Transformation: Ends, Ways, and Means” (*Air and Space Power Journal*, Fall 2006); instead, I will outline a few thoughts that it inspired in one reader. The first concerns the four considerations discussed by Dr. Kem, namely, the geostrategic setting (context), the ends, the ways, and the means—as well as the manner in which these considerations interact.

Undoubtedly, one could consider the overall context as almost a given, impervious to any sort of action. Of course, some powerful countries or organizations might exert some degree of geopolitical influence in a part of the world and for a certain time. One has seen the United States create and sustain governments in South America, and France has done the same in Africa. But, ultimately, what remains of them? Has doing this changed the course of things permanently or even durably? Thus, a particular country must consider the context as a given, a backdrop for its thoughts about the ends it seeks.

The end is the political policy that a country agrees to define and hold. Quite clearly, nearly as many different ends exist as do countries in the world—hardly an exaggeration. In effect, numerous countries lack the power, means, or will to have clearly defined goals for foreign policy. Some blocs, such as Europe, try to organize themselves in order to define common ends, but they do so with difficulty and only over the long term. We therefore live in a world in which the ends sought by countries or organizations (al-Qaeda, the Mafia, etc.) are multiple and, of course, contradictory.

Naturally, this is a source of tension and conflict since each country or organization having an end will obviously seek to attain it. However, for a given country, the flexibility of its ends—that is, of its foreign policy—remains limited. In countries such as the United States and France, political philosophy evolves very slowly. In France, foreign policy represents almost the only point of agreement between the political left and right.

Conversely, one could think that Russia is currently evolving its foreign policy very strongly. In fact, however, it is merely returning to the power formerly possessed by the Holy Russia of the tsars and, once, by the Soviet Union. Since the so-called fall of the Berlin Wall (actually the signal of Russian renewal), Russia has opened itself to a market economy and knows how to both politically and economically optimize the clout conferred by its riches of oil and natural gas. That country has again become powerful because today it has the economic means necessary to wield political power.

Thus, one sees that a country’s end is often a heavy trend that certainly evolves, but with the slowness required for its population to grasp great currents of thought. In contrast, ways and means evolve at a much less restrained speed and rhythm.

People have an uninhibited capacity to conceive of the best manner of attaining their ends. They can exhibit treasures of imagination, patience, and perseverance in order to achieve them. In parallel with their thought about the ways, they display the same energy concerning the means. In these domains, things can move very fast—a phenomenon commonly seen in industrial techniques and

*Editor’s note: The author, a consultant who resides in Marnes-la-Coquette, France, read the French version of Dr. Kem’s article, available at <http://www.airpower.maxwell.af.mil/apjinternational/apj-1/2008/pri08/kem.html>.

revolutions but equally true concerning military tactics and armament.

Ways and means can strongly interact and evolve at the same rapid pace without either of them taking precedence over the other. In effect, the way will spur development of the means necessary to its realization, but the availability of new techniques will permit the implementation of other ways. History contains many examples of these two cases.

Another thought inspired by reading the article concerns the role of mechanized forces and the manner in which they are used, as well as the investment the Allies made in them prior to the Second World War. I find it useful to distinguish between classical conflicts such as that war and more recent forms of discord. The classical variety features regular armies composed of professionals (or of soldiers who have become professionals through their enlistment) usually content to spare civilian populations the brunt of the conflict's operational aspects. The other, more localized, forms—those not conducted solely by professionals—totally involve civilian populations who are obliged to participate.

The thought concerning mechanized forces relates only to classical wars—here linked to the Second World War. It is thus a historical thought without import for the future in that it seems unlikely that such a conflict will recur. Or at least nobody will be around to examine it.

On the one hand, Dr. Kem cites Gen Henry H. Shelton, who said that because of the concerted effort by the Allies before the war, in terms of development, they possessed technology superior to that of the Germans, but that the Germans had better utilized theirs. On the other hand, Gen Charles de Gaulle declared on 18 June 1940, "Foudroyés aujourd'hui par la force mécanique, nous pourrons vaincre dans l'avenir par une force mécanique supérieure" (Vanquished today by mechanical force, we will be able to overcome in the future by a superior mechanical force).¹

I assert that the Germans simultaneously possessed ways and means at the beginning of the conflict. The Englishman J. F. C. Fuller proposed operational doctrine for using armored vehicles (one could summarize his doc-

trine as bypassing areas of strong enemy activity in order to encircle and destroy the enemy), but the Germans applied it first—in 1940. In the pre-war United States, Gen George Patton had great difficulty obtaining funding for the armored-vehicle units whose development he advocated.

As for means, the Germans circumvented the Versailles Treaty and strongly developed their aeronautical industry, the design and manufacture of tanks, cryptographic materials (Enigma), and so forth. Thus, the German Tiger and Panther tanks, despite some defects, performed well and proved more than a match for the American Sherman tanks—reliable and easy to handle but vulnerable due to their excessive height and flammability. German fighters such as the Focke-Wulf 190 acquitted themselves well against the famous British Spitfire. Despite the Allies' possession of radar, German submarines remained numerous and formidable. As long as the Germans possessed both the ways and the means, they continued to win. They maintained their technical effort throughout the conflict, regardless of supply and industrial difficulties from mid-1943 onwards due to Allied ground advances and bombardments. One could cite as examples the first operational jet aircraft (Messerschmitt 262) and the V1 and V2 rockets.

On the other side, the Allies found it necessary to crank up (or restart) the machinery of war. As always, the United States did so with the determination, pragmatism, and energy of an entire unified country. Engineers worked feverishly to convert factories for the war effort, and soldiers benefited from increasingly good training. Soon, therefore, the Allies produced more war materiel than they lost in battle; from this time on, the situation on the ground turned in their favor, and they launched a counteroffensive. Henceforth, the Allies possessed ways and means—both of them necessary to win the Second World War. □

Marnes-la-Coquette, France

Note

1. "L'Appel du 18 juin 1940," *La France*, 18 June 1940. <http://www.charles-de-gaulle.org/dossier/18juin/temoignages/appel.htm>.

An Airman's View of United States Air Force Airpower

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THE FOLLOWING DISCUSSION resulted from a review of a proposed revision to Air Force Doctrine Document (AFDD) 1, *Air Force Basic Doctrine*, and the author's belief that it fails to adequately describe the airpower of the United States and of the US Air Force.¹ Consequently, in this article I take the original AFDD 1 framework and expand it to offer a more comprehensive picture of US airpower and the contributions of the Air Force. My discussion begins with an expansive perspective of US airpower and concludes with elements that combine to explain the "air-mindedness" unique to Air Force Airmen.

To understand Air Force airpower, one must first understand that the United States is an airpower nation. It is a global leader in airpower technology, economically dependent on access to the global domains of airpower (air, space, and cyberspace), and a provider of access to these domains. Its people love the technology of airpower, and they make up a nation of air, space, and cyberspace innovation. US airpower, therefore, is a combination of the nation's air, space, and cyberspace research and development, production capacities (both private and government), commercial capabilities (in and across the three domains), military capabilities resident in its military services, and, most importantly, people who excel in every aspect of airpower activity.² For the purpose of this discussion, the term *airpower* encompasses all three domains: air, space, and cyberspace.³

The Air Force conducts air, space, and cyberspace operations around the globe as the leading "full-service" military provider and protector of the nation's airpower.⁴ The

Air Force provides options to defend the nation and its vital interests by means of efforts in and through the air, space, and cyberspace domains, protecting access to those domains for the nation, as well as for allies and partners. In conjunction with sister services and other instruments/institutions of national power, the Air Force defends the nation and protects access to these global domains as a global good in peacetime and as a matter of necessity during conflict. When and where required, the Air Force uses its access capabilities to obtain control of a domain and then employs its capacities for persistence to sustain that access and control. The ability to protect worldwide access and to project control of air, space, and cyberspace constitutes the Air Force's unique contribution to national defense.

The Air Force's role in US airpower encompasses the synergistic application of air, space, and cyberspace capabilities to project strategic military power throughout the globe. Airmen exploit speed, range, payload, and precision to create effects in the global domains of air, space, and cyberspace, as well as in the maritime and land domains. Unencumbered by the constraints of surface domains, airpower provides the nation and joint team unequalled flexibility in response options to meet mission requirements during either peacetime or contingencies. In defense or on offense, only Air Force airpower can so quickly and precisely provide so many effects anywhere on the planet, in air, space, and/or cyberspace.

Three strategic pillars—global reach, global power, and global vigilance—direct Air Force strategy in the development of ways and means

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to offer flexible options to the president, secretary of defense, and combatant commanders; those pillars function across the spectrum of operations and through every phase of joint and coalition actions. Serving as the conceptual framework for the Air Force, they are therefore neither restricted nor tied to an organizational command structure or platform; they guide the way Airmen think about the application of airpower.⁵

Global reach, which directs the Air Force's determination to offer options and effects anywhere, anytime, spans all three global domains and includes both kinetic and nonkinetic capabilities. The service's reach includes airlift that supports humanitarian-relief operations such as tsunami relief in Indonesia and the transport of soldiers to limit convoy exposure to improvised explosive devices, as well as air-refueling capabilities that support airlift and strike operations around the globe. Reaching out and kinetically producing effects by means of operational concepts such as global strike reflects another aspect of global reach. Finally, the reach provided by Air Force capabilities in the cyberspace domain permits options and effects restricted only by the limits of imagination and technology. Thus, global reach, which transcends all other Air Force capabilities, lies at the core of its two companion pillars.

Global power focuses on providing effects enabled by global reach, those of the kinetic variety often the most visible ones. For example, the termination of news broadcasts from Baghdad during the first night of Operation Desert Storm in 1991 dramatically demonstrated the might of US military airpower. The power of the Air Force's kinetic capabilities greatly contributed to joint and coalition triumphs in Operations Deliberate Force, Allied Force, Enduring Freedom, and Iraqi Freedom, making the war-fighting portions of these missions some of the most successful in US history. In addition, every airlift mission that provides humanitarian aid throughout the world also delivers the power of US values. A C-130 with its American flag tail flash represents a visible statement of US values and commitment to the global community. Similarly,

the ideas, values, and information transmitted through cyberspace give US policy makers powerful options. Indeed, defending and exploiting ever-expanding transmission capabilities constitute one of the Air Force's (and the entire joint team's) key challenges in the future.

Global vigilance underpins Air Force capabilities across the range of military operations. In each of the global domains, the Air Force uses its surveillance and reconnaissance capabilities to develop actionable intelligence to exploit its capacities for reach and power. By integrating its capabilities with the other services, allies, partners, and national agencies, the Air Force can supply policy makers with decision-quality information. For the future, the service will work to improve its coverage (in terms of both area and persistence) and data-fusion ability to offer even greater capability to the combined team. In the future, the Air Force plans for every system to serve as an intelligence-collection gatherer, receiver, or transmitter that can seamlessly plug into the global grid to share data with national systems and those of America's allies and partners.

A foundation based on global partnership supports the three strategy pillars. Without question, global partnerships have increasingly become the key to mission success and will remain so in the future.⁶ In this regard, the Air Force will chart a path beyond its current efforts in foreign internal defense (FID) and foreign military sales. A clear requirement exists to build partnership capacities, beginning with FID missions to lay the foundation for partners to conduct their own internal-defense initiatives. Such engagement will enable the Air Force to operate more effectively with counterparts around the world, extending global reach and leveraging the talents and capabilities of its allies and partners. The service will do more than sell systems—it will look for opportunities to share training, education, and personnel to ensure that its cultural knowledge matches the operational acumen of those allies and partners.

The Air Force executes its strategy within three operational, or war-fighting, global domains (air, space, and cyberspace), seeking to control access to and use of these domains, as

directed by national leadership. The Air Force is prepared to conduct operations in one or all of these global domains to support national defense and ensure their use to secure national interests and to support allies and partners. Although attaining supremacy in any one of these operational domains may not always be possible, the Air Force will provide the joint and/or coalition team with access to and control of a domain to conduct operations, offensively or defensively, in support of mission objectives. Because it supplies a tremendous array of flexible options to policy makers, Air Force airpower can be used in supported or supporting command relationships to carry out the mission. The service rapidly provides effects within and across these global domains, using its asymmetric advantages of range, payload, and precision to meet the needs of national leadership. By working to improve its capabilities, the Air Force will offer policy makers and the joint team new options and greater persistence to access and control operations in these global domains.

The Nature and Characteristics of Airpower

Over 100 years have passed since the Wright brothers' first powered flight; in that time, civil and government efforts have developed and produced technologies that make the United States an airpower nation, allowing today's Airmen to operate with great effect in their global domains. The joint team depends upon US airpower, as evidenced by the fact that each service has significant portions of its capabilities operating in each of these domains. More importantly, the American people rely upon US airpower as an engine and enabler of daily life, economically and personally. Thus, Air Force airpower must ensure access to these global domains.

The nature of airpower emerged from its technological foundation and the unique advantages found in its three global domains. First and foremost, airpower is inherently technological. The air or space domains remain unusable without technology; indeed,

technological innovation created the cyberspace domain in its entirety. The maritime domain is similar in this regard because technology allows mankind to exploit this domain, both in commerce and war. Although our ancestors could hurl rocks, arrows, and other projectiles through the air, they could not access the domains without the requisite technology. As technology advanced, however, the operational nature of the air, space, and cyberspace domains took shape and matured in its usefulness and effect on national objectives and military actions.

The global nature of the three domains constitutes a unique aspect of airpower. The air and space domains have no boundaries other than Earth's surface itself. Although that surface frames the air domain on one side, air covers the entirety of the planet and seamlessly merges with the space domain on the other side. Today, the operational space domain takes airpower to geosynchronous orbit for the most part and occasionally to outer space. The future may see US airpower reaching further out into the space domain. A unique global province, cyberspace can occur anywhere in any of the other operational domains and thus generates great concern among all war fighters. The domain is characterized by the use of electronics and the electromagnetic spectrum to store, modify, and exchange data via networked systems and associated physical infrastructures.⁷ Additionally, cyberspace is unique in that partners and adversaries alike can create new cyberspace, which remains unknown until it plugs into the existing, known cyberspace.

Elevation, the vertical dimension, represents perhaps the most obvious aspect of the nature of air and space power. Technological innovations have provided that power with increasingly capable tools for use in the high ground of these two domains. In essence, this elevation dimension becomes a vertical flank for all Air Force operations, whether offensive or defensive—supported or supporting. For example, imagery from air or space assets can generate information for assessment of agricultural crops, worldwide weather analysis, or traffic reports. Similarly, such imagery offers

insights into an adversary's intentions, enabling US forces to act to prevent conflict or to fight more effectively if crisis prevention or deterrence options fail.

The physical nature of these domains, coupled with technology, allows for dramatic increases in the speed and range of transmitting effects in and through them. In the air domain, this factor allows for speeds in the hundreds of miles per hour; in space, speeds in the thousands of miles per hour; and in cyberspace, transmission at light speed. Each year, airpower is the primary means of transporting millions of people over vast distances and of moving high-value assets from one location to another. No other country can match US space capabilities, and the Air Force possesses the means to track items in space as a service to the global community. In cyberspace, billions of dollars worth of communication traffic and electronic transactions occur at light speed from users around the globe on the Internet, developed by the United States. This level of speed and range of transmission of people, things, and information is possible only within these domains.

The technology inherent to airpower has produced several key, advantageous characteristics in addition to speed and range—precision, for one, which manifests itself not only in terms of weaponry but also in global positioning; navigation; and intelligence, surveillance, and reconnaissance (ISR). These advantages allow the Air Force to employ fewer assets to produce desired effects. In this way, precision has so altered the war-fighting idea of mass that force commanders and policy makers can think in terms of massing effects versus massing forces.

Another such characteristic, theaterwide persistence, derives from Air Force airpower's ability to provide policy makers and commanders with forces capable of long loiter or rapid reconstitution times. Furthermore, in many cases, Air Force space power can produce near-continuous dwell time for ISR and communications services. The advent of unmanned aerial vehicles enables the service to increase dwell time significantly, thereby enabling ISR support or strike missions. Like

precision, increased persistence widens the Air Force's range of flexible options available to the joint team and national political leaders. The image of our service delivering humanitarian aid persists wherever Airmen reach out to refugees or displaced, hungry, and suffering peoples. Each year, Air Force cyber forces engage in the fight to defend cyberspace against hundreds of thousands of attacks. Truly these forces give new meaning to the idea of continuous, persistent operations.

Air Force airpower possesses a tremendous versatility through its adaptation of technology. Increasingly, Air Force capabilities have shown that they can multitask during a given mission—or simply reconfigure to new requirements with little degradation in operations tempo. For example, a platform configured for deep strike on one sortie can be reconfigured for close air support on its next flight. In the future, most platforms in each global domain will have not only a primary function but also the task of data gathering to support ISR activities. Multirole and multitask capabilities give rise to versatile forces that contribute to the flexible options derived from Air Force airpower—a potent combination of efficiency and effectiveness at the disposal of policy makers and combatant commanders.

The nature of airpower also imposes key limitations upon our use of its domains. The technologies that allow such use require support in order to ensure continuous and persistent operation. That is, we must have bases capable of regenerating people and equipment. The Air Force does possess a force-multiplying factor with its air-refueling capabilities, enabling it to extend airpower across its global domain. However, once on the ground, air assets themselves become more vulnerable to attack. Despite these limitations, the high entry barrier of cost means that only a peer competitor with great economic wealth could directly challenge the Air Force in the air domain.

Space power requires specialized launch and recovery sites and highly specialized equipment to allow for operations. As with airpower, space capabilities need fuel and maintenance or they cease to function. In ad-

dition, because of the tremendous costs associated with space operations, few countries will have the means to access this domain directly; however, many peoples on Earth can make use of numerous applications available from space (e.g., information from the global positioning system). Air Force space power must provide capabilities to ensure access to the space domain and, if necessary, to deny access to a potential adversary. Today, this requirement drives the militarization of space; tomorrow, it may necessitate its weaponization. That decision, of course, remains one for US policy makers.

In order to function in a meaningful manner, cyberspace must have its physical infrastructure—analogue to bases for aircraft, a tether from which operations occur. Fueled by electricity, it too must either have a continuous fuel source or deal with the limitations of battery capacity and the need to recharge. Creating and functioning in cyberspace, however, is inexpensive. Many nations can train and employ a few cyberspace agents yet produce significant effects (from the tactical to the strategic level), for good or ill, in the cyberspace domain. These characteristics combine to make cyberspace one of the most demanding domains in which to operate—a tremendous challenge to the joint team and the nation. Further, because so much information of such great value travels through this domain, the Air Force and the other services must assure access to and defense of it.

Airpower in all its forms remains inherently limited by its inability to physically seize and occupy territory.⁹ We can apply varying levels of control in each domain, however. For example, in the interwar years, the British achieved a level of air control over Middle Eastern tribesmen by using airpower to restrict and/or direct ground movement. This modified “air occupation,” however, was limited in both temporal and geographic scope. If policy makers and military leadership decide to impose physical occupation, then a combination of airpower and ground power must complete the mission.

The Airman's Perspective

Because airpower possesses the unique nature described above, Airmen have developed a distinct perspective that guides how they think about it in their operational war-fighting domains of air, space, and cyberspace. Gen Hap Arnold referred to this “Airman's perspective” as air-mindedness.⁹ First and foremost, Airmen view airpower from a global perspective. Since airpower operates in and across global domains, Airmen begin with this perspective and often work across as well as within theater boundaries. Having limited assets, the Air Force must view its commitments through a worldwide lens. In a given theater, Airmen must focus across all boundaries—geographic or surface-based operational lines—to support theaterwide requirements. Although a given effect might be local, the perspective is always theater-to-global. This view results in a strategic perspective that Airmen carry into every operation.

Scarcity also factors into the Airman's perspective. Because airpower capabilities are costly, we procure them in limited numbers. This limitation makes most air, space, and cyberspace forces high-demand, low-density national assets. As such, military airpower is usually matched to a coalition/joint force commander's (JFC) objectives and desired effects having the highest value. During conflict, the Air Force makes control in each domain its priority effect. In the air domain, control may be expressed in either local or theaterwide terms; in space, usually in either theater or global terms. In the latter domain, control capabilities may seek to ensure that friendly forces have access to space assets, while denying access and/or services to an adversary. Similar to control in space, that in cyberspace will mature to encompass a theater-to-global perspective. What might appear as a local denial-of-service attack could progress to a theaterwide shutdown if cyberspace power fails to defend the entire team. If surface forces must engage an adversary, then the priority effect for Air Force airpower could become support of ground and maritime operations. The broad range of effects that high-demand, low-

density Air Force airpower brings to the joint team typically results in our thinking of military airpower as a strategic asset that meets the JFC's priority mission requirements by means of its employment across all levels of conflict and throughout the spectrum of operations.

The phrase "speed, range, and payload" captures another important aspect of the Airman's perspective. Not only can airpower operate across domains but also it can do so rapidly to deliver payload (effects) at any point in the global domains and upon Earth's surface. Airmen believe they serve as a global maneuver force, unrestrained by geographical boundaries, that provides policy makers flexible options which allow the United States to take political and/or military initiative. Whether tasked to deliver relief aid in the Berlin airlift or to tsunami refugees in Indonesia, or to strike at the heart of an adversary's command and control (C2) system by using either kinetic airpower or nonkinetic cyber power, the Air Force can quickly and effectively deliver tactical-to-strategic effects anywhere on the planet. Today, the Air Force delivers effects with amazing accuracy, day or night, in all kinds of weather. Many Airmen say that "flexibility is the key to airpower," but a more accurate statement is that "airpower is the key to flexibility" for the joint team and national policy makers.

Airmen believe that they need domain expertise to execute military airpower to its best advantage in support of taskings from national and combatant commanders. This belief has led Airmen to argue for the selection of commanders with air and space expertise to fill positions such as the coalition or joint force air component commander (C/JFACC). According to the Air Force, any airpower expert, regardless of service component, could serve as a C/JFACC. That said, our service provides the JFC with the most robust and flexible C2 to develop strategy, as well as plan, execute, and assess air, space, and cyberspace effects. The design of the centralized control and decentralized execution found in its operations-center capabilities ensures unity of effort and command to support national and JFC objectives. In the future, we may need a coalition

and/or joint component commander to guarantee that the JFC's team can protect its own use of the cyberspace domain and exploit or deny its use by an adversary.

In response to the demands of irregular warfare, the Air Force is examining its capabilities to distribute tactical-planning functions to tactical echelons of operation. To offer ground forces increasingly responsive air, space, and cyberspace power in the dynamic operational environment of irregular warfare, the Air Force must develop new ways to achieve effects without sacrificing unity of effort and command for the JFC. Increasingly, adversaries opt to challenge the United States with asymmetric means. Rather than massing their forces to fight US forces head-on, they use unconventional and irregular means to offset the tremendous capabilities of the joint team, especially those of the Air Force. Our service must become equally adept at centralized and distributed control (primarily in planning), along with decentralized execution.¹⁰

Finally, Airmen traditionally think of airpower and the application of force from a functional rather than geographical perspective. They do not divide the battlefield into operating areas as do surface forces. Typically, Airmen classify targets and their missions in terms of the effect their actions would have on the adversary, not in terms of the physical location of the targets or mission activities and/or execution platforms. This approach normally leads to more inclusive and comprehensive operations that favor strategic and operational perspectives over tactical ones. We can summarize air-mindedness as follows:

*Control of the Vertical and Cyber Dimension
Is Generally a Necessary Precondition for
Control of the Surface*

The first mission of the Air Force involves accessing and controlling air, space, and cyberspace for the joint team. Those tasks may require the defeat or neutralization of enemy air forces so that friendly operations on land, at sea, in the air, and in space can proceed unhindered; at the same time, the Air Force must

protect US military forces and critical vulnerabilities from attack.

Airpower Is Usually the First Force That Can Hold an Enemy at Risk, from the Tactical to the Strategic Levels

War and peace are decided, organized, planned, supplied, and commanded, beginning at the strategic level of war. Airpower can hold an enemy's centers of gravity and critical vulnerabilities directly at risk, immediately and continuously. It can bring capabilities to bear on that enemy's political, informational, military, economic, and social structures simultaneously or separately. Air Force airpower also has great capability for nonlethal strategic influence, as in humanitarian-relief and security-cooperation activities.

Air Force Airpower Gives the Joint Team the Means to Exploit, Rapidly and Simultaneously, the Principles of Mass and Maneuver

Because the vertical environment has no natural lateral boundaries to prevent air, space, and cyberspace systems from quickly concentrating their power at any point, Air Force airpower is often the first force to arrive in-theater and begin operations. The speed with which the Air Force can maneuver and concentrate effects allows it to dominate the fourth dimension—time. This ability to produce rapid effects gives policy makers and commanders a wide array of flexible options to deter potential adversaries, deny and/or defeat enemies, or provide a variety of alternatives for security cooperation and peace support.

Air Force Airpower Can Be Employed Jointly or Independently to Meet Mission Requirements

The tremendous C2 capabilities of the Air Force enable it to employ in either small or large units to meet mission tasking. Whether the task entails sending a flight of stealth bombers to deliver a show-of-force strike, deploying expeditionary wings to fight a major conflict, providing persistent ISR, or support-

ing a humanitarian crisis, the Air Force has in place, at all times, the C2 necessary to ensure unity of effort, effect, and command in and across its global domains.

Airpower Is Inherently Technological, and Advancements in Speed, Range, Payload, Precision, and Persistence Have Resulted in an Air Force Capable of Providing a Vast Array of Flexible Options to Civilian and Military National Leaders

Airpower's versatility allows rapid, simultaneous employment against strategic, operational, and tactical objectives. That versatility derives not only from the characteristics of air forces themselves but also from the manner in which they are organized and controlled.

Air Force Airpower Results from the Effective Integration of Platforms, People, Weapons, Bases, Logistics, and Supporting Infrastructure

No one aspect of air, space, and cyberspace capabilities should be treated in isolation since each element is essential and interdependent. Ultimately, the Air Force depends upon the performance of the people who operate, command, and sustain air, space, and cyberspace forces. Furthermore, our service's capabilities can produce strategic effects even when conducting tactical missions. Therefore, these unique elements require an Airman's expertise to command them at the component level of operations.

Supporting Bases with Their People, Systems, and Facilities Is Essential to Launch, Recovery, and Sustainment of Air Force Forces

The Air Force's ability to move anywhere in the world quickly and then rapidly begin operations has remained one of its most important aspects. However, we must balance the need for mobility against the need to operate at the deployment site. The availability and operability of suitable bases can become the dominant factor in employment planning and execution.

Air Force Airpower Can Respond Rapidly, Span the Globe, and Precisely Deliver Effects (Kinetic or Nonkinetic; Lethal or Nonlethal; Security-Related or Humanitarian in Purpose) to Defend the United States and Its Vital Interests and Assure Access to the Global Domains of Air, Space, and Cyberspace

The Air Force engages in these activities constantly across the spectrum of operations. As a first-in, last-out expeditionary force, it delivers effects anytime, anywhere.

Ideally, an Airpower Expert Will Command and Control Military Airpower

Component commanders must have expertise over the domains in which they operate. The global domains of air, space, and cyberspace are not unique in this regard. Today, the centralized control of military airpower resident in the C/JFACC ensures application of the

high-value, low-density capabilities to meet the JFC's priorities, thus avoiding the "penny packet" use of yesteryear.

The United States is a nation with incredible airpower and an air force to match. Its people have a pioneering drive, as reflected in the nation's development of commercial and military airpower capabilities, and a determination to excel in both arenas. The Air Force operates in the global domains of air, space, and cyberspace, defending the nation and ensuring both access and control as required by policy makers. Although this article has focused on what the Air Force brings to US airpower, each member of the joint team contributes to the nation's airpower capabilities, creating the world's preeminent airpower force. □

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Notes

1. An offer to rewrite the "Airpower" chapter in AFDD I prompted me to write this article. I present this conceptualization of airpower to replace what I perceive as an anemic "lowest common denominator of agreement" text. Though not given to hyperbole, I do believe that the Air Force's seminal doctrinal document needs a bolder proclamation of airpower.

2. A. T. Mahan eloquently made a similar argument in *The Influence of Sea Power upon History, 1660–1783* (New York: Dover Publications, 1987). See chap. 1, "Discussion of the Elements of Sea Power."

3. Within the Air Force, one finds much angst over using a single term, especially *airpower*, as a sole descriptor. That said, the roots of modern air, space, and cyberspace power draw from aviation in peace and war, scientific discovery, and the barnstormers of a past era. The use of *airpower* as the overarching term only recognizes the genesis of flight, not an end state or terminus of activity and achievement. This broader terminology applies to both US and Air Force airpower. When the article refers to capability in a given domain, it uses the terms *airpower*, *space power*, and *cyberspace power*, as applicable.

4. In 2005 Michael W. Wynne, secretary of the Air Force, and Gen T. Michael Moseley, chief of staff, released the Air Force's new mission statement, which expanded Air Force operational domains from air and space to include cyberspace. See MSgt Mitch Gettle, "Air Force Releases New Mission Statement," *Air Force Link*, 8 December 2005, <http://www.af.mil/news/story.asp?storyID=123013440>.

5. In recent years, the Air Force has allowed specific major commands and/or platforms to characterize its strategic pillars. The discussion here returns those pillars

to the strategic level—one that transcends organizational structure or weapon systems and platforms.

6. Some strategists argue that global partnership is a subset of global reach. This article suggests that global partnership stands alone for two key reasons. First, it cuts across each of the three strategy pillars, affecting what the Air Force can accomplish as it projects power and reach. Second, the US need for partnership across all of the Department of Defense will raise this element of national security operations to ever-higher levels of importance. Simply stated, its importance dictates that we give it a place at the strategic table.

7. This definition of cyberspace, developed by the USAF Cyberspace Task Force, remains one of the best characterizations of this domain. See briefing, Dr. Lani Kass to the Air Force Association, subject: "A Warfighting Domain," 26 September 2006, http://www.maxwell.af.mil/info-ops/usaf/cyberspace_taskforce_sep06.pdf.

8. However, the imaginative cyber warrior could make a case for capabilities that might allow one to occupy cyberspace, albeit with some temporal limitations.

9. See AFDD 2, *Operations and Organization*, 3 April 2007, 2, http://www.dtic.mil/doctrine/jel/service_pubs/afdd2.pdf.

10. By "distributed control," I mean a construct that builds upon the responsibilities of the air component coordination element in today's fight. In the future, the Air Force may find that it needs to distribute some of its C2 elements—strategy and planning come first to mind. Tomorrow's fight may require strategy and planning efforts at much lower levels of C2 than those we see today in Central Command—specifically, in Iraq and Afghanistan. The Air Force needs to prepare today for a more distributed fight tomorrow.

Asking the Right Questions

CAPT DAVID BLAIR, USAF*

REFLECTING UPON Mr. Remy Mauduit's excellent article "Effects-Based Information Battle in the Muslim World" (*Air and Space Power Journal*, Spring 2008), I found that I had more questions than answers. Reflecting further, I realized that this was probably a good thing. We have a surplus of answers, but perhaps we have a shortage of the right questions. After all, an answer is useful only when paired to its correct question; a good answer to a bad question is still a wrong answer. Therefore, rather than add to our stockpiles of answers, let us instead seek questions.

First, let us frame the question. One of counterinsurgency's counterintuitive truisms asserts that what seems offensive may, in fact, be defensive, whereas what seems defensive may, in reality, be one's best attack.¹ This truth may hold just as well for a global insurgency as for a local one. A terror group uses violence to replace "the way things are" with "the way things should be." An insurgency adds to all of the above the support of other broad factions also discontented with the way things are. People can sometimes become more than people; the insurgent becomes the lightning rod for the people's grievances. Have our enemies become that lightning rod? Al-Qaeda continues to draw a borderless distinction between the way things are and the way they should be. It has demonstrated a willingness to use unconstrained violence to move the world from the former category into the latter. The last piece, the broad support of other discontented factions, is the game changer. How effectively has al-Qaeda aligned global discontent to its narrative? Is our global war on terror a kind of counterinsurgency writ large? Nascent groups with only the most tenuous link to Ibn Wahhab's way of thinking have taken the name *al-Qaeda*. Osama bin Lad-

en's pronouncements are as sure to make the news as any presidential press release. Is it even conceivable that a distant son (disowned by his family a decade ago, no less) of the divorced 10th wife of the Yemeni construction magnate Muhammad bin Ladin could be the counterpoint to Francis Fukuyama's vaunted "End of History"?² So our first question becomes, "Is al-Qaeda a terror network or a global insurgency?"

The second question is, "Was 11 September 2001 a military operation, or was it advertising?" The ubiquitous World Trade Center twin towers have been the backdrop of this war from the outset. Did we ever figure out why? In the immediate aftermath of the attack, explanations such as "the terrorists attacked because they could" tended toward the nihilistic. Alternately, some advanced the paper-tiger theory that if we took one big hit, we would turn tail and come home. And certainly our adversaries got more than they expected, for worse and for better. They got hit hard, but the value of our currency and the strength of our alliances seemed to get caught in the blast pattern of our military response. Perhaps the terrorists adapted. Or perhaps, even from the beginning, it was more about the message than the messenger. Despite his guerilla coming-of-age in Afghanistan, bin Laden comes from a family deeply immersed in world trade, so he doubtless understood the significance of the World Trade Center. In the days that followed the destruction of the towers, all the world's good guys (along with most of the in-between guys) declared their support for the United States, which means, implicitly, that all the world's bad guys are now pushed toward al-Qaeda. So, not even a decade later, al-Qaeda's brand recognition rivals that of Coca-Cola; it has become the standard by which world terror is judged. Which then raises a question: did we acciden-

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tally help al-Qaeda in this? The Mexican bandit Pancho Villa looks much more exciting on a wanted poster; we took bin Laden, superimposed his picture on the ugly pockmark of his greatest accomplishment, and spread his image around the world. So we must ask one more derivative question: how does one beat a brand name? I don't know, but I'm reasonably sure it's not the same way one beats a military.

Moving from the attack to the attackers, our next question asks, "Is a suicide bomber a combatant or a munition?" One wins a war by killing the enemy's combatants, hopefully before they get a chance to use their munitions. The old adage "kill the archer, not the arrow" was in all likelihood not written with kamikaze aircraft in mind. It does make the question more complicated, but there is still an underlying truth which holds that one must destroy what one's enemy cannot replace, rather than what he can replace. So we must ask, what can our enemies not replace? What is essential to them; what can they not do without? Let's take a step back and examine ourselves. Consider an F-16 launching with Joint Direct Attack Munitions (JDAM) on a conventional-war interdiction strike. The JDAMs are expendable; they are written off as soon as the F-16 leaves the ground. But in the most immediate sense, the aircraft is irreplaceable because without it, the JDAMs will never reach their targets. In the same way, aren't suicide bombers already entering the endgame as they record their obituary videos? It would be the height of stupidity to place one's hopes on the survival of a person who has decided that his only remaining purpose is to fail at survival in the most violent way possible. And that which is essential must survive. So the individual suicide bomber cannot be essential. Returning to our JDAM example, even the F-16 is replaceable in the broader view: other aircraft can drop the JDAMs. What, then, is strategically irreplaceable? One viable answer, at least, is the JDAM factory. Without it, there are no JDAMs; without any JDAMs, there is no need for the F-16. What if the suicide bomber is a JDAM, a package of explosives maneuvered to its target by a guidance system? Then it would make sense to hit the factory manufacturing those

guidance systems. This is no Schweinfurt; I highly doubt we will find such a factory on a FalconView mapping display. But if it is an idea that directs the explosives to their targets, then perhaps we will find this factory somewhere in idea space. Which are irreplaceable: terrorists or terror messages? If we answer this question, perhaps our air tasking orders will start hitting much closer to our enemy's heartland.

Next, let us consider terrain: "Where does our world end and theirs begin?" In the Cold War, that question was quite straightforward. Accordingly, there was one set of rules for idea-space operations back home and a quite different set of rules for idea-space operations in bad-guy land. After all, Reuters wasn't exactly waiting with bated breath for the latest videotape from *Pravda* and TASS. One cannot say the same for Associated Press and Al Jazeera. Ironically, as much as we talk about network-centric warfare, our adversaries may have bested us on certain aspects of the strategy. The Internet and integrated global economy provide them a signal corps and an arsenal. The international news media is no less interconnected. So where is the boundary between public affairs and psychological operations when one can read the Maxwell AFB newspaper in Riyadh, Saudi Arabia, and jihadi Web sites in Montgomery, Alabama? An answer is limited by definitions; sometimes one has to change those definitions to get the right answer.

Having considered the battlespace, we look to questions of strategy. Let us start with the topic that dominates our headlines: "Is the conflict in Iraq a war or a battle?" The war of Normandy makes no sense, but the battle of Normandy in the context of the Second World War makes perfect sense. One has to take land in order to drive on the enemy's homeland, but how does one take land in a war of ideas? Which was more important, the end of Saddam Hussein or the beginning of a free Iraq? Did we allocate our attention accordingly? Thankfully, the Iraq troop surge has given us a chance to go back and revise our answers to these questions. As Gen David Petraeus inscribes his doctoral thesis upon the sands of Mesopotamia, I hope, with no small amount

of self-interest, that his second thesis defense goes as well as his first.

Turning to the axis of conflict, we must ask, "Is al-Qaeda's war against America, or is it against Muslims?" It almost seems intuitive that the war is with us, yet look at whom the terror organization kills. *Takfiri*, or apostate (by al-Qaeda's exceedingly skewed definition) Muslims, seem to consistently end up atop its target lists. Al-Qaeda has killed orders of magnitude more Muslims than it has killed Americans. If its war is with us, then these casualties are nothing more than collateral damage. On the other hand, if its war is with Muslims, then those dead were the primary targets and our dead were just good theater for our enemies. If al-Qaeda's war is with us, then the Arab world becomes a disinterested third party in a conflict between two disliked factions. But if its war is with Muslims, then there is no sideline and no sense whatsoever in a "see no evil" strategy. Of course, people have to find some answers on their own, but we can still help those answers along.

Another of those better-facilitated-than-told answers completes our series of questions: "What does the caliphate actually look like?" Is it a Wahhabi Disneyland or a Mecca of trade and scholarship? Our enemies seem to have cornered the market on answers to this question. Perhaps that monopoly can be broken. I am hardly a scholar of Islamic history, but I seem to recall that the caliphate was known for its scholars and merchants. By the standards of the time, the tax on non-Muslims was a paradigm of religious freedom. I can't see famous Muslim scholars and philosophers such as Averroes or Avicenna fitting in well in a Wahhabi madrasa (Muslim religious school), and bin Laden is a far cry from the Muslim hero Saladin. We can't cut and paste history into a world where it no longer belongs and expect it to retain its meaning. Even if we could, Ibn Wahhab wasn't around to know what the caliphate was like in any event. More than eight centuries stand between him and the rightly guided caliphs. What if al-Qaeda's vision of the caliphate is a past that never was—fundamentally incompatible with the historical caliphate or any modern equivalent?

To Wahhabi eyes, Dubai is a symbol of the West. Yet, the seven-star hotels of Dubai are far closer to the splendor of the actual caliphate than anything found in the mountains of Waziristan. After all, the caliphate was known for its greatness, and the emir of Dubai can buy European land. Al-Qaeda can blow up night clubs. Which is a more coherent narrative of Arab greatness? What if we could steal our enemies' argument? What would they be left with if we tore the heart out of their dreams? That is an answer I would enjoy hearing.

As the forever-quoted Sun Tzu tells us, know your enemy, know yourself, and victory in 100 battles will be yours. In order to do either, one must begin with the right questions. If I may hazard a guess at a few of these questions, I would first ask who we are. Then I would ask where we want to go. Finally, I would ask how we can get there. I will not embarrass myself by trying to answer these questions in this confined space with my confined mind, but I do not doubt that these answers are already present in the fertile minds of our diverse (and disparate) foreign-policy establishment. Perhaps we are in need of a "unified field theory" of foreign policy, a metanarrative that starts with the most important questions of interest and influence and works downhill from there.³ Among our military theorists, academic experts, and technical specialists, we have veritable warehouses of answers. The challenge seems to lie in asking the right questions in the right order. □

Hurlburt Field, Florida

Notes

1. Paraphrased from "Paradoxes of Counterinsurgency Operations," Field Manual 3-24 / Marine Corps Warfighting Publication 3-33.5, *Counterinsurgency*, December 2006, 1-26. <http://www.usgcoin.org/library/doctrine/COIN-FM3-24.pdf>.

2. Francis Fukuyama, *The End of History and the Last Man* (New York: Free Press, 1992).

3. An influence-based "theory of everything" might reconcile some of the seeming paradoxes that we face in this conflict, and it might tie the instruments of national power together along the lines of the joint interagency task force as envisioned by Gen Peter Pace, former chairman of the Joint Chiefs of Staff.

Asymmetric Air Support

MAJ GARY L. BURG, USAF*

THE INITIAL PHASES of Operation Iraqi Freedom and Operation Enduring Freedom involved extensive close air support (CAS). Just as the battlefield has evolved into a more asymmetrical composition, so have ground-force requests for support. Most CAS requests no longer call for putting ordnance on target.

Air component requirements for providing tactical air support in Iraq and Afghanistan have evolved outside the traditional roles of CAS and reconnaissance, creating the need to revise air support that the air component doctrinally provides to ground forces.¹ This article describes asymmetric air support (AAS), a new area of support not mentioned in current doctrine, and proposes the development of new doctrine. It also addresses issues that must be resolved to give all parties involved a better understanding of the support requested of the air component, and questions those decades-old methods of operation that have not evolved with technology. It is designed to stimulate discussion about better utilizing the limited assets available without wearing out our current aircraft inventory; the article does so by examining current doctrine, identifying common terminology, introducing some non-traditional ideas, and addressing the issue of unmanned aerial vehicles (UAV).

The land component conducts full-spectrum operations, and its joint tactical air strike requests (JTAR) reflect these operations.² Full-spectrum operations consist of four elements: offensive operations, defensive operations, stability operations, and civil support operations.³ Based on the land component's wide range of operations, the air component receives CAS

requests ranging from a movement-to-contact operation to armed overwatch for religious celebrations.

The Status Quo

The land component is acutely aware that under current doctrine, it is apportioned/allocated CAS assets based only on CAS requirements.⁴ The word *close* in CAS does not imply a specific distance; rather, it is situational. The requirement for detailed integration due to proximity, fires, or movement is the determining factor, but this is becoming less and less relevant to what the ground component actually needs in order to serve as a stabilizing force. The need for CAS to deliver ordnance in close proximity to friendly forces is becoming a smaller factor in the current environments of Iraq and Afghanistan.

Over the last five years, fighter/bomber aircraft of the coalition air forces have evolved to become more than just strafing/bombing platforms. Granted, their targeting pods were designed to employ precision-guided munitions and reduce collateral damage, but the inherent capabilities of the pods have expanded their role into widely used and effective reconnaissance/surveillance. Unfortunately, the Air Force lacks the intelligence infrastructure to exploit the information garnered from the pods and other sources. The Air Force should have intelligence capability integral to the squadron, as did an RF-4 squadron, if it is going to fully exploit the intelligence gained from full-motion video (FMV) footage.⁵

In today's operations, the land component has a great need for reconnaissance platforms:

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some people have even called it a "limitless hunger."⁶ This need far exceeds the assets available to cover requirements, some of which are for armed reconnaissance to enable immediate strikes against the enemy during time-critical operations (e.g., indirect-fire setups and emplacement of improvised explosive devices). These requests may not involve close proximity to friendly forces or require detailed integration since no operations may be occurring at the proposed reconnaissance location. Even so, none of the current fighters in the Air Force's inventory were designed as FMV reconnaissance platforms. The F-16C+ (Block 30), a reconnaissance-capable aircraft, replaced the RF-4 as the Air Force's primary armed-reconnaissance platform, but its capabilities lack the real-time feed desired by the land component, which wants the real-time, FMV feed that it gets from aircraft equipped with the Remote Operations Video Enhanced Receiver (ROVER). Because the land component can't fulfill reconnaissance-support requirements from organic assets or from surveillance and reconnaissance platforms, it now uses the JTAR process to request armed reconnaissance from traditional CAS assets. Although referred to as CAS to keep within doctrinal limitations, this is not CAS as the air component community would typically define it. Unfortunately, fighter units assigned to the two theaters of operations must provide CAS to the land component. This is where the friction starts.

Terms and Terminology

Terms integral to traditional CAS, such as *forward line of troops* and *fire support coordination line*, often do not exist when aircraft perform AAS since the land component has "control" of the entire area of operations. Today's CAS environment in Iraqi Freedom and Enduring Freedom uses many new terms, such as *armed overwatch/top cover*; *opportune surveillance*; *air presence*; *air effects*; *nontraditional intelligence, surveillance, and reconnaissance* (NTISR, also known as nonstandard ISR); *aerial reconnaissance*; *counter-improvised explosive devices* (C-IED);

countermortar; *counterrocket*; *counter-indirect fires* (C-IDF); *countersmuggling*; *counterinsurgency*; *positive identification*; FMV; *precision-guided munitions*; *low collateral damage estimate weapons*; *show of presence*, *show of force*; and ROVER. Joint Publication (JP) 3-09.3, *Joint Tactics, Techniques, and Procedures for Close Air Support (CAS)*, 3 September 2003, addresses none of these. Yet, all of these terms and abbreviations are found within the JTARs submitted for support in current coalition operations. The air component's tasks are anything but traditional CAS. Depending on who is talking, not only do these tasks have different meanings/requirements but also the ability to assess their results has variations. Until the services agree upon which mission types should be supported by strike assets, there will be a battle over requirements, and thus force posture, of strike assets. This is the *first* area that we need to resolve during the doctrine-revision process.

Break the Mold

Under current doctrine, no CAS fighter/bomber asset has a mission set/role for NTISR. Capabilities of the new targeting pod linked with ROVER have not added a new role for which the fighter/bomber community trains in the ISR arena, but everyone knows that the capabilities exist. It is time to acknowledge the requirement to use them simply because the air component does not have enough UAVs in its inventory to meet demands. From a fighter aircrew's standpoint, this is not an appropriate use of its weapons platform, but from the land component's perspective, this is a great capability that it wants to use.

If the Air Force acknowledges its fighter/bomber NTISR capability and is willing to support the land component with these assets in this role, half of the controversy would end. In doing so, however, some long-term problems would emerge, affecting the fleet's ability to meet requirements of its airframe life span. Another hurdle would involve getting the fighter and bomber communities to acknowledge this as a viable role. Tactical air assets are expensive reconnaissance platforms. The Air

Force and the Army must consider the intended, ultimate use of Air Force assets and determine if the effects outweigh the lack of efficiency. Additionally, Air Force leaders must make some hard decisions about the roles that our CAS assets will support. This may mean restricting CAS assets to CAS roles and removing their ISR roles. Importantly, we must remember that the land component is the supported component (the customer) and that the air component is the supporting component (the provider). Whose requirements have the higher priority—the Army's need for ISR or the Air Force's need to maintain the life expectancy of the tactical air support fleet?

Although the air component currently cannot fulfill all of the land component's requests, most feedback from that component has been positive. Aircrews, on the other hand, do not seem pleased with the support they are asked to provide. The fighter and bomber communities feel that they are wasting much airborne time by searching for the proverbial needle in the haystack.

The land component requests armed reconnaissance to provide one of two effects: find the enemy or deter/deny him. When it tasks the air component for C-IDF or C-IED, it hopes that the supporting airframe will find the enemy in the act and be able to neutralize the threat or prevent him from employing IDFs or IEDs. If the supporting aircraft meets either of these objectives, the mission is successful. Unfortunately, the prevention role is not well recognized by manned supporting aircraft. C-IDF or C-IED mission reports usually indicate that nothing was accomplished and that the aircraft wasted time performing the requested task. The measure of merit should be results from the customer's standpoint. If the air component produced the desired effect from the land component's standpoint, then the mission was a success.

Some individuals have suggested that the air component become the supported command during certain operations that the land component cannot fully cover—countersmuggling/border-operation roles, for example.⁷ Both Iraq and Afghanistan have long, unguarded borders with no natural barriers for channel-

ing smugglers to a point where ground forces can interdict them. It is impossible for the land component to fully control these vast expanses of border. We can control some of these areas only by designating airpower as the lead and supported command.⁸ Yet joint task force/land-component leaders seem to dislike anything that would put them in a supporting role. Thus, they fail to take full advantage of the capabilities of platforms such as the Joint Surveillance Target Attack Radar System and UAVs, and we therefore underperform in the countersmuggling/border-operation roles. Consequently, both air and land leadership misunderstands the supported/supporting relationship. For a stabilization mission, equal partnership is a prerequisite for success in certain missions. Assignment to either a supporting or supported role for a stabilization mission does not deny equal partnership. The reluctance of land leaders to recognize that fact dooms them to underachieve in the full spectrum of AAS.

From the land component's standpoint, the air component can't control the border since it is not a ground-operation force. Air forces can produce effects on the ground, but, short of a nuclear strike, those effects are generally temporary. This is a manpower issue; the land component just doesn't have enough troops. A great force multiplier, airpower should nevertheless be applied in a surgical manner when it integrates with ground forces. Air Force intelligence, operations, and command and control systems are not suited to taking the lead in ground operations. The supported service is usually the one that accepts more risk. Equal partnership should equate to equal contribution or risk. Currently in Iraq and Afghanistan, this is not the case. The question becomes, is the air component willing or able to provide support for full-spectrum operations? Once again, from the land component's standpoint, this is what the air component signed up for in the supporting role. Therefore, it should be willing to provide full-spectrum air support.

We must also consider the Air Force's traditional use of the fighter element. Within the bounds of the fighter aircraft's current mode

of operation, a two-ship formation is the smallest maneuver element. The main concept behind this formation—mutual support—is based on threat reaction. When the aircraft functions as a CAS platform, this should continue as the minimum maneuver element, but when a fighter/bomber is tasked to an ISR role, it *may not* be required. In light of the absence of threats from the air and only minimal ones from the ground (small-arms fire and possibly rocket-propelled grenades), fighters should be able to operate in a single-ship mode. Navy, Marine, and some coalition fighters already conduct single-ship operations within 60 miles of their wingmen. It is time for the Air Force to consider this mode of operation when it is tasked for the ISR role. Here again, the Air Force needs to acknowledge its ISR capability, which would enable more efficient use of its assets and increased ability to support the land component.⁹

Unmanned Aerial Vehicles and Their Roles and Capabilities

Reconnaissance plays a critical role in an air-support mission for national stabilization. The MQ-1 Predator and MQ-9 Reaper UAVs both provide valuable FMV to the ground commander and ISR community. Unfortunately, requests for support far exceed the assets available to cover those requests. The land component is fully aware of the capabilities offered by the air component's FMV assets; when it can't get FMV support from organic assets or through ISR division requests from the coalition's air and space operations center, the land component uses the JTAR request process. This is the primary reason that traditional reconnaissance/surveillance requests are being passed to piloted, fixed-wing CAS assets, which possess these inherent ISR capabilities.

Arming of the Predator and Reaper has made them viable, multirole assets that can be tasked for either ISR or CAS missions. They do, however, lack the ability to strafe, which limits their options for escalation of force. If we had an endless supply of armed Predators and Reapers and if the frequency spectrum

could handle the data links, then we would have a good chance of significantly reducing the number of piloted, fixed-wing CAS assets in-theater. One Predator mission can provide up to 12 hours of continuous coverage unrefueled, while it would take four two-ship piloted aircraft formations flying three-hour windows and using over 250,000 pounds of fuel to cover that same time frame. At a minimum, we could greatly decrease the number of hours flown by piloted, fixed-wing assets, thus significantly reducing the amount of air refueling.

Conclusion/Questions

Traditionally, CAS has been defined as putting ordnance on target in close proximity to friendly forces, but this is not how we use the vast majority of the air component's tactical air assets in today's stabilization missions. That doesn't mean that ground forces do not require our support, especially when most of our weapons platforms have multiple capabilities, but armed ISR assets can provide CAS, and ISR does not require two-ship formations. Now is the time to revise our official doctrine for integrating with ground forces. The Air Force needs to address how it can best support requirements to prevail in a counterinsurgency environment. Air Force and Department of Defense leaders need to answer the following questions:

1. Where is the dividing line between supporting the land component with air assets that have multiple capabilities and maintaining the combat fleet in its designed roles?
2. At what cost is the Air Force willing to fly its CAS platforms to support ISR taskings?
3. How long can the fleet continue flying at its current rate, and what are the long-term implications?
4. What are the training implications and requirements of using CAS assets in the ISR role and armed ISR platforms in the CAS role?

5. Does the stabilization/AAS mission create a need for a new airframe that can do it all (provide FMV, bomb, strafe, and loiter a long time without requiring tanker support)?

As a starting point for answering these questions, I recommend that we immediately stop using fighter aircraft (CAS platforms) for the C-IED and C-IDF roles and limit their use in the armed-reconnaissance/NTISR role. I would return all Predators to the control of the combined force air component commander and equally distribute them between ISR and CAS. In the CAS role, we would use these Predators primarily in C-IDF and C-IED missions. I would limit the fixed-wing fighter assets to direct land-component operations outside air bases

or forward operating bases (traditional CAS) and place 15-minute ground-alert fighters (a two-ship package) at strategically located bases within the two areas of responsibility in Iraq and Afghanistan. Based on our current operations in both locations, I would immediately look into modifying a current ISR platform to have an alternate role in the CAS mission or developing a new multirole platform that can operate in a permissive air superiority environment (either manned or unmanned).

The Air Force needs to allocate and use its resources wisely. Time is of the essence in making this happen if we wish to preserve the longevity of our fleet. □

Al Udeid Air Base, Qatar

Notes

1. The term *air component* encompasses piloted, fixed-wing fighters and bombers from the US Air Force, Marine Corps, and Navy, as well as coalition aircraft tactically controlled by the combined force air component commander.

2. The term *land component* refers to US, Iraqi, Afghan, and coalition ground forces.

3. The Army defines its operational concept of full-spectrum operations as follows: "Army forces combine offensive, defensive, and stability or civil support operations simultaneously as part of an interdependent joint force to seize, retain, and exploit the initiative, accepting prudent risk to create opportunities to achieve decisive results." US Army Field Manual 3-0, *Operations*, February 2008, 3-1, [http://usacac.army.mil/cac2/repository/materials/FM3-0\(FEB%202008\).pdf](http://usacac.army.mil/cac2/repository/materials/FM3-0(FEB%202008).pdf).

4. Joint Publication 3-09.3, *Joint Tactics, Techniques, and Procedures for Close Air Support (CAS)*, 3 September

2003 [incorporating change 1, 2 September 2005], ix, http://www.dtic.mil/doctrine/jel/new_pubs/jp3_09_3ch1.pdf.

5. Col Jay B. Silveria, Supreme Headquarters Allied Powers, Europe, European Command, Belgium, to the author, personal communication, 4 March 2008.

6. Maj Bruce Munger, director of operations, 20th Air Support Operations Squadron, and joint tactical air controller instructor, Operation Iraqi Freedom, October 2007–April 2008, to the author, personal communication, 5 February 2008.

7. Col Seth P. Bretscher, chief of combat operations, International Security Assistance Force Air Component Element, Kabul, Afghanistan, to the author, personal communication, 17 February 2008.

8. Ibid.

9. Silveria to the author, personal communication.

Human Performance Enhancement

Überhumans or Ethical Morass?

COL LEX BROWN, USAF, MC, SFS

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Ritalin seems to have become the drug for our day. As competition on every level intensifies, our preoccupations as a culture increasingly center on performance. And our children, whether we realize it or not, have been serving as a proving ground for the premise of medicating to enhance performance. Are we likely to see a time in the not-so-distant future when a large part of America will be running on Ritalin?

—Lawrence Diller, MD
Running on Ritalin

THE PRIMARY FUNCTION of the Air Force is to organize, train, and equip forces that a combatant commander will employ during the course of joint operations.¹ The Air Force's health service and science and technology (S&T) communities, among others, support this function by providing expertise in human performance.² In essence, then, the Air Force, in conjunction with other military services and civilian agencies, is responsible for providing human performance capabilities to the joint force. Ideally, we should optimize and enhance these capabilities so that we field (human) weapon systems superior to those of current and potential adversaries. Such thinking has driven heightened interest within the military services regarding human performance, in part sparked by the Office of Net Assessment's report entitled *Human Performance Optimization and Military Missions*.³ Thus, Department of Defense (DOD) Health Affairs formed a Human Performance Optimization Steering Committee,⁴ and US Joint Forces Command sponsored a human performance enhancement (HPE) joint-capability document (in draft) under the guise of joint-force health protection. For the purpose of this discussion,

HPE encompasses those methods that enable Airmen to operate beyond established and sustainable performance thresholds. HPE brings to mind cutting-edge fields in biotechnology such as genomics and nanotechnology. However, we should conceptualize HPE as covering a spectrum ranging from intrahuman (e.g., biotechnology and pharmacology) to extrahuman (e.g., hardware and software), including such tools as selection, training, equipment, pharmacology, and surgery.

Pharmaceuticals

In the wake of this surge of interest in HPE, the Air Force medical community must be poised to consider performance-enhancement modalities within the context of Western society's principles of medical ethics: autonomy, nonmaleficence, beneficence, and justice. This concern is perhaps most pressing for pharmacological HPE since the military services employ this modality in current operations (e.g., fatigue countermeasures). Dating back to the fourth century BC, one of the most fundamental principles in medical ethics—first do no harm—received much attention during the first years of the twenty-first century, given the

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renewed public, judicial, and legislative interest in drug safety. For example, such popular and widely prescribed drugs as troglitazone, cerivastatin, rofecoxib, valdecoxib, and cisapride were withdrawn from the market. Manufacturers added boxed warnings to the labels for celecoxib and other nonselective, nonsteroidal, anti-inflammatory drugs, and to the labels for all antidepressants. There is continued concern over inaccurate perceptions that approval by the Food and Drug Administration (FDA) represents a guarantee of safety based on a high degree of clarity and certainty about a drug's risks and benefits. In reality, it is impossible to know everything about a drug at the point of approval because of the complexity of its mechanisms of action and because pre-approval clinical testing generally occurs in controlled settings using carefully selected populations.⁵ At present a critical need exists for large, simple clinical trials to test the safety and real-world effectiveness of widely used drugs as well as those currently under development.⁶ In the meantime, in the absence of a public-health mandate, the ethical principle of autonomy dictates that physicians and patients cooperatively make individualized risk-benefit decisions regarding the selection and use of pharmaceutical agents for the prevention and treatment of human diseases.

Outside the clinical setting, how is risk-benefit defined in HPE? In the latter case, the individual is healthy, and the benefit is hypothetical (e.g., decreased likelihood that a drowsy Airman will commit an error of omission or commission with significant effect on the mission). The benefit is hard to define quantitatively, as is the risk. Often the drug is used for a non-FDA-approved indication, and the intended population does not represent the one employed in preapproval testing or observed during postapproval surveillance. Although clinical testing reliably detects adverse events occurring in one of 100 patients, it probably will not observe such reactions occurring in one of 1,000 patients—or less frequently, even if they are very severe.⁷ Thus, many HPE studies of pharmacologic agents are unlikely to involve sufficient numbers of participants (i.e., statistical power) to ade-

quately assess the risk of adverse events. For example, the authors' cursory review of the literature found no HPE studies of modafinil as a fatigue countermeasure that even came close to utilizing 100 participants. Though not surprising, given the difficulties of conducting large trials, such a situation does raise ethical concern over meaningful, informed consent (i.e., the ethical principle of autonomy) since both risks and benefits remain largely undefined. In addition, can military leaders reliably depend on pharmaceutical countermeasures when they plan operations and at the same time respect the ethical principle of autonomy? Although use of the current generation of HPE agents is limited to select populations and situations, could more widespread usage in the future create an inherently coercive environment and compromise individual autonomy if performance is a factor in the selection and promotion of Airmen? Given these considerations, initially well intended HPE requirements such as a nonaddictive pill to maintain vigilance in the face of routine, prolonged wakefulness; a prohormone to increase muscular strength and endurance during training; or pharmacotherapy to enhance cognitive function and decision making may have ethically unacceptable ramifications from a medical and societal perspective.

Nanotechnology

Many of the ethical issues raised with pharmaceutical HPE also apply to nanotechnology, a burgeoning field featuring particles smaller than one micron. Nanotechnology may be poised to transform medicine with potential uses spanning all aspects of disease diagnosis, prevention, and treatment as well as HPE applications such as embedded intelligence.⁸ However, at present we lack comprehensive and conclusive information on the long-term health and safety effects of nanomaterials.⁹ For example, preliminary evidence suggests that the large surface area of insoluble nanoparticles can trigger inflammatory responses, and a substantial body of evidence supports the conclusion that chronic inflammation can

predispose an individual to cancer.¹⁰ Although we need more research into the health effects of nanotechnology before we can consider human use, such concerns highlight the larger issue of prolonged and potentially lifelong surveillance when using HPE agents. Since cancers usually have latencies of 15–20 years or more, ideally we should require an assessment program akin to the *Longitudinal Study of Astronaut Health* for Airmen exposed to HPE agents in order to adequately address the ethical principles of autonomy, nonmaleficence, and beneficence.¹¹ Current fiscal realities make such a program impracticable and unlikely to be implemented. However, we could begin other forms of surveillance, such as conducting periodic health surveys or tracking medical-claims data for Airmen receiving government-funded medical benefits, at significantly less expense. Ultimately, we will discover adverse effects associated with long latencies only by tracking the health of Airmen long after they have separated from military service. The potential need for such surveillance is a hidden cost that should be factored into decisions to use HPE agents.

Genetics

Like nanotechnology, advances in genetic S&T have enormous potential to revolutionize medicine in terms of assessing risk for and treating human diseases. However, the same technology that enables gene-transfer therapy for treatment of clinical disease can also be used for HPE. Already the term *gene doping* has entered the sports lexicon.¹² For example, it may be possible to transfer genes that release human-growth hormone to build muscles or that enable muscles to use oxygen more efficiently for endurance. On the horizon, gene transfers may target the calcium channels in muscles to make them more responsive, strengthen bones, and blunt or eliminate the response to pain. At the extreme, genetic engineering—to date limited to plants and animals—could be used to create an optimized “warrior” germ line sometime in the not-too-distant future. For a long time, bioethicists

working in the field of genetics have voiced concerns about the ethics of genetic enhancements, especially those inherited as a result of germ-line, gene-transfer technologies. They have raised questions about the long-term safety of such interventions, the viability of consent when cross-generational effects are prevalent, and the possible impact of enhancements on our conceptions of human achievement and excellence.¹³ Although the creation of a warrior class may sound implausible in contemporary Western society, what about other societies—whether allied, neutral, or adversary? What about the apparently less sinister gene doping?

Conclusion and Recommendations

This discussion has only scratched the surface of potential ethical issues brought on by advances in HPE. Up to this point, the dialogue has focused solely on biotechnology. However, ethical dilemmas likely will exist across the HPE spectrum. For example, are there ethical implications in conducting psychological screening and training to develop and harden aggressive personality traits in Airmen? What are the ramifications for those Airmen’s families during their military service and for society at large upon their separation or retirement? Even a seemingly innocuous HPE intervention such as nutritional supplementation now has attendant ethical considerations, given evidence from recent intervention studies of previously unrecognized risks caused by nutrient toxicity and nutrient interactions.¹⁴ Overall, we should not view HPE as inherently unethical since it may in fact be ethical in terms of beneficence (i.e., increased likelihood of survival). Given the military services’ heightened interest in human performance and the ongoing efforts to develop HPE road maps and requirements, we should address ethics early in the process. Unfortunately, existing policy, concepts of operations, and doctrine do not address HPE, let alone the associated ethical issues.¹⁵ Thus, we urgently need to confront this situation in light

of the rapid pace at which new S&T advances with potential HPE applications appear. That said, we offer four recommendations.

First, the Air Force should include human performance in its existing and future doctrine—the officially accepted practices taught to Airmen, related to means and involving issues of how strategy is carried out.¹⁶ Thus, doctrinally addressing human performance compels the Air Force to officially contemplate and codify the means by which it will use human weapons to achieve military strategy. The LeMay Center for Doctrine Development and Education Center at Maxwell AFB, Alabama, is the logical agency for coordinating this work. However, given the unprecedented nature of this subject matter within the doctrinal community, we require a deliberative process that actively involves and informs all relevant stakeholders, including the war-fighter, S&T, medical, legal, and bioethical communities. Equally important, this work must proceed quickly so the Air Force can proactively manage rather than react to HPE.

Second, the Air Force surgeon general should develop a code of practice that balances accepted medical ethics with the military's unique need for superior (human) weapons. Ideally, this task would occur concurrently with the development of an official Air Force human-performance doctrine. Air Force medical personnel are at the front lines of this issue, advising commanders on HPE and prescribing pharmaceutical HPE agents. However, as we have discussed, HPE doesn't fit well within ethical frameworks developed for treating disease. In the absence of clear professional or societal guidance, we think that this ethical uncertainty should be addressed at the organizational level rather than leaving it to individual medical personnel for resolution. The Air Force Medical Service should establish a panel composed of medical leadership and bioethicists at the Air Force and major-command levels, as well as repre-

sentatives from the state medical boards (which license DOD medical personnel), to draft a code of practice for endorsement by the Air Force chief of staff. Doing so will lead to a consistent and defensible use of HPE agents across the Air Force.

Third, the Air Force should establish an extended longitudinal-surveillance program for Airmen exposed to current and future HPE agents. The Air Force surgeon general should have primary responsibility for administration and oversight of this program, which would serve the two separate goals of surveillance of occupational health effects from HPE agents and research into their long-term effects. However, a credible, independent agency such as the Institute of Medicine should be commissioned to develop the protocol for conducting this surveillance and periodically assessing the data collected. Information on exposures to HPE agents must be collected and correlated with individual Airmen, as is presently done for other occupational exposures such as toxic industrial materials, noise, and so forth. The Air Force should then assume responsibility for the lifelong surveillance of those Airmen exposed to HPE agents, including the conduct of periodic surveillance exams and compensation for associated costs incurred.

Finally, the assistant secretary of defense for health affairs should conduct a workshop to define minimum evidentiary standards (e.g., sample size, duration of assessment, measures of merit, etc.) for preapproval and postapproval studies assessing the effectiveness and safety of HPE agents. This workshop should include experts from academia and nongovernmental organizations (e.g., the Institute of Medicine), government research agencies (e.g., the National Institutes of Health), and appropriate regulatory agencies such as the FDA. Its recommendations should form the basis for subsequent DOD policy. □

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Our Air Force combines capabilities in the domains of air, space, and cyberspace to deliver Global Vigilance, Global Reach, and Global Power to the Joint force.

—Air Force Posture Statement 2008

Air-Mindedness

DR. DALE L. HAYDEN*

WHAT MAKES AIRMEN different from soldiers or sailors? It has to be more than the uniform they wear or the technology they maintain and operate. The distinction is the unique perspective they bring to the art of warfare—an attribute we loosely define as air-mindedness. It might have been easier to gain consensus on a definition 15 years ago, when the Air Force was occupied principally in strategic operations in defense of the nation. However, since then the Air Force has been almost exclusively engaged in theater-specific operations, such as Northern and Southern Watch, Allied Force, Enduring Freedom, and Iraqi Freedom. These operations and the global constructs of space and cyberspace began to reshape how Airmen perceive their contributions and cast new questions about what Airmen bring to the fight.

In his work *The Command of the Air*, Giulio Douhet wrote, "As long as man remained tied to the surface of the earth, his activities had to be adapted to the conditions imposed by that surface. . . . By virtue of this new weapon [the airplane], the repercussions of war are no longer limited by the farthest artillery range of surface guns, but can be directly felt for hundreds and hundreds of miles over all the lands and seas of nations at war."¹ In an attempt to identify the unique contributions that airpower brings to surface warfare, Gen Henry H. "Hap" Arnold termed the Airman's "particular expertise and . . . distinctive point of view . . . 'air-mindedness.'"²

Air-mindedness should not be confused with airpower doctrine and its implementation, such as centralized control and decentralized execution. Like esprit de corps, it binds Airmen together and guides their actions. However, again like esprit de corps, it is diffi-

cult to define. Learned airpower scholars continue to debate the definition of air-mindedness, and reasonable Airmen continue to disagree—not because airpower cannot be defined but because, like viewing an object through a prism, it depends upon one's perspective.

Accordingly, air-mindedness does not have a static definition but captures nuances that change over time. In its simplest form, air-mindedness is the lens through which Airmen perceive warfare and view the battlespace. As warfare has evolved, so has the definition of air-mindedness. First and foremost, it implies an offensive mind-set. During the interwar years, air-mindedness described a strategic vision of airpower that produced the concept of daylight precision bombing in World War II. During the Cold War, it provided the rationale for nuclear deterrence, deep-strike bombers, and ballistic missiles. Air-mindedness has never been platform-centric, so it enables today's Airmen to think first about desired effects and then about the means of attaining them. Consequently, it enables Airmen to express the concepts of space and cyberspace operations as easily as they expressed airpower concepts only a few years earlier.

Thus, Airmen are better equipped to exploit the other global commons of space and cyberspace since they view them as domains rather than as tools. The distinction is that a surface operator might ask, "How can I do my job using space or cyber?" Conversely, an Airman would ask, "How can I achieve the desired effect through space or cyber?"

Air-mindedness, however, does have certain constants. It is a global, strategic mind-set providing perspective through which the battlespace is not constrained by geography, distance, location, or time. The air-mindedness lens enables Airmen to think about conflict in

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which force-on-force and armies in the field are only one element. It implies the ability to influence the links between adversary materiel and moral strength. Although Airmen rarely claim to target the enemy's will, they perceive a direct connection between his physical capacity and desire to continue the fight.

Air-mindedness also connotes a cultural characteristic that distinguishes Airmen from their partners in the other services. The ability to range over the battlespace rapidly and with relative impunity while surface forces often struggle to advance even short distances creates the potential for conflict among the services. Additionally, the perception that Airmen operate in the relative safety of a highly technical, pristine environment while their surface partners remain in much closer proximity to the dangers of the battlefield over longer periods of time creates a divide.

Brig Gen Billy Mitchell said that airpower was "the ability to do something in the air."³ That ability has sparked innovation and a cul-

ture among Airmen distinct from the surface approach to employing military force. The notion of air-mindedness probably will not find consensus among either Airmen or their surface partners. However, if it furthers the discussion, then this article has accomplished a significant objective by encouraging Airmen to examine why they believe what they believe so they may become better advocates of their profession. □

Maxwell AFB, Alabama

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The Reconstitution Imperative[©]

LES DOGGRELL*

It is thus an essential condition of strategic leadership that forces should be held in reserve according to the degree of strategic uncertainty.

—Carl von Clausewitz, *On War*

THE US SPACE community was alarmed by China's antisatellite (ASAT) test of 11 January 2007 but has made little practical response.¹ By performing a public demonstration, China put the world on notice of its ability to hold spacecraft at risk. As many pundits note, the United States is critically dependent on space capabilities to fight future conflicts. Some industry analysts have speculated that the destruction on 22 February 2008 of a spacecraft identified in the press as USA 193 was intended to demonstrate a US ASAT capability, yet in a future conflict, destroying opposing spacecraft will not replace lost space capability.² Given the relative dependence of the United States on space systems, what, if anything, should we do to prepare for future space operations under contested conditions? One possible solution calls for preparing to replace—or reconstitute—lost capability, at least to some extent.

Congress and senior defense officials have identified Operationally Responsive Space (ORS) as a means for responding to future threats to US space systems, but no one has articulated specifically what ORS will do. What elements of ORS would react to a counterspace threat? No one has published a clear description of ORS and what it does. Consideration of the guidance provided by Congress, and of the needs and technology available for a reconstitution capability, can identify, at least in outline, features and capabilities that ORS or any

reconstitution approach would require in order to respond in a timely manner to a threat to our space capability.

The Department of Defense (DOD) has anticipated the development of counterspace forces. In 2001 former secretary of defense Donald Rumsfeld warned of a possible "space Pearl Harbor."³ The US Space Transportation Policy, issued in 2005, calls for the ability to "respond to unexpected loss or degradation of selected capabilities, and/or to provide timely availability of tailored or new capabilities—to support national security requirements."⁴ The same policy establishes 2010 as a goal for demonstrating a responsive space capability:

Before 2010, the United States shall demonstrate an initial capability for operationally responsive access to and use of space to support national security requirements. In that regard, the Secretary of Defense, in coordination with the Director of Central Intelligence, shall:

- a) Develop the requirements and concept of operations for launch vehicles, infrastructure, and spacecraft to provide operationally responsive access to and use of space to support national security, including the ability to provide critical space capabilities in the event of a failure of launch or on-orbit capabilities; and
- b) Identify the key modifications to space launch, spacecraft, or ground operations capabilities that will be required to implement an operationally responsive space launch capability.⁵

Thus, policy direction to take action clearly exists.

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In testimony before Congress in March 2007, Dr. Ronald Sega, executive agent for space and undersecretary of the Air Force at that time, identified ORS as the United States' activity to prepare for a threat to our space systems: "This ORS focus includes the ability to launch, activate and employ low-cost, militarily useful satellites to provide surge capability, reconstitute or augment existing constellations, or provide timely availability of tailored or new capabilities."⁶ Deputy Secretary of Defense Gordon England articulated this view in a memorandum of 2007 that established ORS as the initiative to meet the US Space Transportation Policy's goal. Despite this direction, the DOD has received continuing criticism for failing to define ORS accurately and succinctly. A recent report to Congress defined ORS broadly as "assured space power focused on timely satisfaction of Joint Force Commanders' needs."⁷ However, this definition encompasses almost any imaginable military space capability. According to one commentator, "ORS has essentially been a loosely defined and directed series of space and rocket hardware procurements."⁸

The US Air Force has struggled to define ORS.⁹ Is it a launch system, a series of spacecraft, infrastructure improvement, an acquisition-reform effort, or all of these? What size and number of spacecraft with what capabilities are involved? What type of system do we need to respond to a military threat to US space capabilities? We have answered none of these questions with any certainty, but we must do so before we can field a solution. Congress provided some direction in the John Warner National Defense Authorization Act for Fiscal Year 2007.¹⁰ However, no agency has published a reconstitution concept for ORS.

We can easily identify conceptual responses to threats to our space systems. China and Russia advocate eliminating the threat through a treaty banning space weapons.¹¹ Weaning our defense establishment from its dependence on space systems might reduce the vulnerability. Establishment of passive and active defense of spacecraft could offer another alternative. Preparation for the reconstitution of space capability following the failure of other

measures could represent a solution or part of a set of solutions to the loss, or threat of loss, of space capability. According to Dr. Sega, Mr. England, and Congress, ORS provides the means to reconstitute space capabilities, yet within even this limited scope, it is unclear exactly what ORS will do to perform this mission.

We could replace any lost national-security space capabilities by maintaining a complete backup inventory, holding these spacecraft in standby for responsive launch aboard an inventory of launch vehicles. The ORS mission-needs statement, signed by the chief of staff of the Air Force in 2001, documented the need for the launch component of this type of approach.¹² An analysis of alternatives (AOA), completed in April 2005, examined a wide range of launch architectures for performing responsive space missions. It found that rapidly replacing lost intelligence, surveillance, and reconnaissance as well as precision navigation and timing capabilities had a significant impact on the results of hypothetical future military campaigns.¹³ This finding depended upon an inventory of spacecraft designed for responsive launch. Based on the result of the AOA, the Air Force initiated an Affordable Responsive Spacelift project.

Although space systems are relatively short lived, the current on-orbit US capability represents decades of investment at a level of tens of billions of dollars per year. Building, much less maintaining, a complete replacement inventory, even if technically feasible, is well beyond reasonable expectations of increased defense expenditures. Such an investment in a contingency need becomes even less likely when compared to the necessity of recapitalizing existing defense systems.¹⁴

The growing inventory of commercial satellite capability is a potential source of capacity that we have used in conflict and that would likely see use in the future. One challenge to this approach includes the increasingly multinational character of the commercial space market. The impact of conflict on international consortiums would largely depend upon the specific parties and interests affected by the conflict. For example, the "neutrality" of commercial spacecraft would prove difficult to

maintain if they were providing militarily essential services.

In the Defense Authorization Act of 2007, Congress effectively ended the Affordable Responsive Spacelift program by redirecting the president's budget and providing guidance that ORS is intended not as a complete "replacement" capability but as a small satellite-based system:

It is the policy of the United States to demonstrate, acquire, and deploy an effective capability for operationally responsive space to support military users and operations from space, which shall consist of—

- (1) responsive satellite payloads and busses built to common technical standards;
- (2) low-cost space launch vehicles and supporting range operations that facilitate the timely launch and on-orbit operations of satellites;
- (3) responsive command and control capabilities; and
- (4) concepts of operations, tactics, techniques, and procedures that permit the use of responsive space assets for combat and military operations other than war.¹⁵

In the same act, Congress provided further guidance on the systems to be procured, establishing a \$20 million goal for the purchase of a launch vehicle and a \$40 million goal for the purchase of a spacecraft. Congress let the DOD determine the composition and structure of the ORS force.

By establishing cost goals, Congress has determined the type of ORS force structure it expects to be created. A rough rule of thumb for pricing spacecraft at \$100,000 per kilogram would indicate that Congress intends ORS spacecraft mass to not exceed approximately 400 kilograms. Conveniently, this is about the size of the spacecraft that we could launch on a \$20 million vehicle—and very close to the size and cost of the tactical-satellite class of spacecraft.¹⁶

Lt Col Ed Tomme has examined the ability of small spacecraft to perform military missions, noting the cost/performance trade-offs.¹⁷ These trade-offs are generally negative on small spacecraft, but Colonel Tomme does

point out the ability of space systems to observe denied territory and provide strategic capabilities. It is important that we determine the minimum space capability required to support the joint force in conflict. Gen Kevin Chilton, commander of US Strategic Command, defined this level of performance as "good enough to win."¹⁸ As noted by Colonel Tomme, one small spacecraft provides very little capability, compared to the existing constellations of large spacecraft. Several authors have suggested various configurations of orbital constellations to provide persistent coverage.¹⁹ A reconstitution system would need to incorporate constellations of several small spacecraft to effect such coverage. Additionally, small, single-purpose spacecraft, by definition, would not serve multiple missions. Spacecraft orbits are carefully tailored for the mission envisioned and matched to the capability of the spacecraft. For example, multiple types, rather than a single type, of spacecraft would provide surveillance and reconnaissance, communications, and navigation capabilities. A minimal reconstitution capability would involve multiple constellations of different types of spacecraft. Each typical constellation, which would involve three to eight spacecraft per mission, would occupy orbits appropriate to the mission and capabilities.

An expressed ORS objective calls for providing greater capability in smaller, less expensive future projects and delivering these on shorter timelines. However, better, faster, and cheaper space systems have proven elusive. Even on accelerated timelines, we cannot currently produce small launch vehicles in less than 18 months. Spacecraft-fabrication timelines are even longer. An optimist might estimate two years to produce and test a small spacecraft. Although we can, and should, take steps to reduce these timelines, even optimistic projections of responsive fabrication times greatly exceed the likely warning and allowable recovery time to respond to a significant loss of our space capability. Providing meaningful capability within days to a few weeks of an attack is possible only if we have stockpiled the necessary spacecraft and launch vehicles. Given the reserves of bombs, boots, and beans maintained

for future military contingencies, it should come as no surprise that a military space capability would require similar stockpiling.

Both the Air Force Research Laboratory and Naval Research Laboratory are working on technologies to reduce the need to stockpile spacecraft and still meet a responsive timeline, with the goal of assembling a spacecraft within six days.²⁰ To do so, however, either the government or a contractor must maintain an inventory of preengineered and prequalified components. We must still bear the cost of keeping this inventory and required personnel on standby to perform the assembly. The success of the rapid assembly and low-inventory business model, as illustrated by Dell computers, relies on high volume. We need a trade-off study to evaluate the use of fully assembled spacecraft at the launch site versus the use of a centralized small-satellite depot that would contain spacecraft in various states of assembly. But the costs of inventory would be significant. Likewise, a common, modular, or plug-and-play spacecraft bus would reduce the nonrecurring and recurring expense of small spacecraft and could prove helpful in meeting the \$40 million spacecraft goal. Even assuming the success of these efforts, we would still need an inventory of busses and payloads to meet likely wartime needs.

An alternative approach involves stockpiling the spacecraft on orbit in advance of need. The on-orbit reserve, built in peacetime, could provide capability continuously. This approach is particularly useful if the United States receives strategic warning of an impending or likely conflict; however, given China's ASAT threat, on-orbit stockpiling may do little more than provide additional targets. Detailed evaluation of the threat and potential-response timelines are central to considering the trade-off between launch-on-schedule and launch-on-demand strategies. A future opponent is not likely to provide two years of strategic warning, and the United States may not be sufficiently prescient to take advantage of the warning it does receive.

Like all military capabilities, stockpiling responsive space hardware alone will not be sufficient to ensure its readiness for future need.

An end-to-end capability to perform a reconstitution mission will require facilities such as launchpads; storage, assembly, and integration structures; on-orbit command and control; and telemetry systems integrated into the tasking and dissemination infrastructure as well as their associated facilities.

Once on orbit, we will need to fly reconstitution spacecraft. Two opposing operating concepts exist, and an optimum solution will likely draw from both. To operate seamlessly in the augmentation role or as a replacement for a lost or damaged spacecraft from an established constellation, reconstitution spacecraft could be operated by mission-focused command and control structures and operations teams now in place. This concept maximizes the use of the existing operations infrastructure and minimizes disruption from the users' perspective. Alternatively, rapid-response reconstitution spacecraft could be operated by facilities dedicated specifically to that purpose. This concept is most applicable if the various reconstitution spacecraft are built with a common bus and operations concept. For example, a reconstitution communications spacecraft must integrate into the existing or remaining communications, command, and control infrastructure. However, a small spacecraft capable of performing the reconstitution mission is not likely to use the same command and telemetry structure as the spacecraft it replaces, thus requiring some dedicated functionality. Significant research in spacecraft autonomy now under way suggests that enhanced autonomy may relieve the challenges presented by rapidly launching multiple constellations of spacecraft. Additionally, such autonomy could aid in freeing operators from the telemetry-monitoring function, allowing them to focus on commanding the spacecraft to respond to threat actions and optimizing payloads and orbits in response to changing needs.

More important than hardware, a reconstitution system will require people to operate it. These personnel, whether military, civilian, or contractor, will need to train and practice their wartime tasks before executing them in earnest. Additionally, they should use such a system in their own training exercises since we

cannot reasonably expect all of these interactions to occur in wartime without extensive peacetime practice. Military professionals know from experience that, in combat, they can rely only on well-trained troops familiar with their weapon systems.

Though not unusual for a military function, maintaining a full staff in peacetime to respond to a wartime surge requirement would prove expensive for a responsive space concept, regardless of whether it involved contractor or military personnel. The need for a small peacetime cadre and the ability to surge in time of crisis to perform a responsive reconstitution mission could align well with either Reserve or National Guard missions. Unlike the US ballistic missile force, space reconstitution would not likely find itself responding to a "bolt from the blue" attack. Before developing a staffing plan, we should further analyze the cost trade-offs of meeting different response times.

Providing a reliable reconstitution capability will require recurring, end-to-end demonstrations. These training or exercise launches of responsive spacecraft could coincide with major military exercises. In addition to building up a wartime reserve of hardware, ORS or any other serious reconstitution effort would need to provide continuous production of spacecraft and launch vehicles to support training and exercises. We could also utilize these capabilities to augment the on-orbit inventory for lesser contingencies. In addition to allowing the crews and users to train with their weapon systems, continuous use and production would help keep the inventory up to date.

Existing space architecture faces a continuing problem with the inability to modernize. Once launched, spacecraft hardware can seldom be modified.²¹ Turning over the inventory of small, responsive spacecraft by consuming them in training, exercises, and contingency response would enable the incorporation of new, improved technology into replacement spacecraft. Additionally, ongoing production would allow for continued support of the industrial base that produces the spacecraft. The viability of long-term reconstitution capability depends upon maintenance of its under-

lying technology and industrial base. Obviously, any strategy that projects a one-time production run will not support a continuing industrial base.

A viable concept of reconstitution, even one with very modest goals for the amount of restored capability, will not be cheap. Assuming that we could procure spacecraft and launch vehicles that assure a "good enough to win" level of performance at costs near the goals stated by Congress (a large assumption), creating an inventory of multiple constellations of small spacecraft will cost hundreds of millions of dollars. Supplying and maintaining personnel and facilities to support these systems will add considerably to the cost. Finally, peacetime training and the replacement of consumed assets represent additional expense. Producing space systems in larger quantities will significantly reduce the unit costs of these systems.²² Granted, we can expect some reduction; however, in terms of the total system level, costs will remain significant.

As Colonel Tomme and LTC Bob Guerriero note in their articles examining tactical satellites, the key question is not whether we can build such a system but whether we should.²³ We can answer that question only by comparing the magnitude and likelihood of the threat to the cost and effectiveness of alternative concepts. Practitioners of military operations analysis are adept at performing AOA. One central question for any AOA entails the cost-effectiveness of proposed approaches. Because this type of analysis is a statutory requirement before initiation of a major defense program, it should begin as soon as possible. The potential for "paralysis by analysis" exists but is counterbalanced by the cost of analysis compared to that of performing on-orbit experiments to determine what capability is "good enough to win."

The reliance of US forces on space capabilities creates an asymmetry between the stakes and power calculations of potential adversary nations that are considering counter-space operations. An effective reconstitution capability, demonstrated in peacetime, could deter adversaries from contemplating such action. Comparing the value and cost of a space-

reconstitution capability should fully reflect the importance of a system capable of deterring this type of attack. We need to weigh this consideration carefully against the immediate needs of the war fighter.

Joint doctrine has included reconstitution of space forces as a defined mission since 2002.²⁴ Yet, despite the Chinese test of 2007, the United States has no more capability today than it did in 2002. Inventorying a complete replacement for our on-orbit space capability is financially unrealistic. Congress and the president have issued directions to build a small, responsive, satellite-based reconstitution system. We should immediately perform an analysis to determine the cost-effectiveness of such a system, the priority of missions, and the necessary system capabilities. Funding to support the fielding of an inventory of spacecraft, launch vehicles, and infrastruc-

ture should follow rapidly. If ORS is the program to meet this need, as directed by Dr. Segal, Mr. England, and Congress, then we should focus ORS developments toward this end and not dilute them through lack of focus.

Former secretary Rumsfeld used the example of the Japanese attack on Pearl Harbor to describe a possible future event. The analogy has appropriate features. The United States has long considered space a sanctuary, investing heavily over decades to develop a set of preeminent capabilities. On 7 December 1941, it "discovered" not only that battleships were suddenly vulnerable to air attack but also that those ships were no longer a key determinant of national power. For the United States, the question is not whether future opponents will develop counterspace systems but how ready it will be to respond. □

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12. "Mission Need Statement AFSPC [Air Force Space Command] 001-01, for Operationally Responsive Space-lift" (Peterson AFB, CO: Headquarters AFSPC/DRS, 30 October 2001), http://www.responsivespace.com/ors/reference/ORS_MNS_Final.pdf. Gen John P. Jumper signed the statement on 20 December 2001. The Joint Requirements Oversight Council validated it in April 2002.

13. Despite completion of the Operationally Responsive Spacelift Analysis of Alternatives in 2005, AFSPC has not released it. Congress's removal of funding for Affordable Responsive Spacelift from the president's budget for fiscal year 2007 made the analysis moot.

14. An alternative concept entails building and launching additional capacity before it is needed, but the economic and military utility of swarming the enemy with potential targets in advance of need is highly questionable.

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24. Joint Publication (JP) 3-14, *Joint Doctrine for Space Operations*, 9 August 2002, IV-10, http://www.dtic.mil/doctrine/jel/new_pubs/jp3_14.pdf. See also Air Force Doctrine Document 2-2, *Space Operations*, 27 November 2006, http://www.dtic.mil/doctrine/jel/service_pubs/afdd2_2.pdf. A draft revision of JP 3-14 incorporates a brief description of ORS in an appendix.

Our Airmen have maintained constant watch, deployed continuously, engaged America's adversaries directly, responded to human crises around the world, and provided the Global Vigilance, Global Reach, and Global Power to secure our Nation.

—Air Force Posture Statement 2008

Self-Evaluation

A Disconnect in Our Values

COL JIM SLIFE, USAF*

IN THE LAST two years, I've drafted a dozen performance reports and recommendations for officer promotion. That may seem like a reasonable number that ought not be too burdensome for one officer to handle, but I find it quite unsatisfactory. Why? Because I haven't been in a supervisory role in the last two years. I drafted each of these documents at the request of officers whose supervisors were unwilling to prepare the documents and required the officers being rated to put together their own reports and recommendations.

Self-evaluation (the practice of writing our own—or allowing or directing our subordinates to write their own—performance reports and promotion recommendations) is forbidden. The governing guidance is unambiguous: "Do not have the ratee write or draft any portion of his or her own performance report. . . . [Senior raters] will ensure no subordinate commander/supervisor asks, or allows, an officer to draft or prepare his or her own PRF [promotion recommendation form]. . . . No officer will be asked to draft or prepare his or her own PRF."¹ Nevertheless, this practice seems to be growing in our Air Force.

For instance, several years ago, I served on a promotion board and took the opportunity to spend some time with the captains who participated as "board recorders." By virtue of their presence, they were obviously highly regarded in their own communities and seemed bright young officers. When we discussed this topic over dinner, all of them told me that in

their short careers they had written every one of their own performance reports.

On another occasion, I asked a group of Air Force interns—captains identified as near the top of their peer group from a wide cross section of the Air Force—how often they had written their own reports. Almost unanimously, they indicated they had done so every time.

The Disconnect in Our Core Values

This anecdotal evidence suggests widespread behavior that undermines two of our institutional core values: "integrity first" and "service before self." Our *Little Blue Book of Air Force core values* tells us that responsibility is a fundamental part of integrity: "No person of integrity is irresponsible; a person of true integrity acknowledges his or her duties and acts accordingly."² More recently, Air Force Doctrine Document (AFDD) 1-1, *Leadership and Force Development*, has defined "responsibility"—a component of the core value of integrity first—as follows: "Airmen acknowledge their duties and take responsibility for their own successes or failures. A person with integrity accepts the consequences of actions taken, never accepting or seeking undue credit for the accomplishments of others."³ Asking, expecting, or allowing our subordinates to draft their own performance reports simply doesn't square with our institutional concept of integrity because as raters, we are specifically pro-

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hibited from doing so and are charged with the responsibility of ensuring that our subordinates are not put in a position to write their own reports.

Further, when we ask our subordinates to write their own reports (or establish a culture in which they believe they have to), we undermine our core value of service before self. The *Little Blue Book* identifies "rule following" as a critical component of service before self: "To serve is to do one's duty, and our duties are most commonly expressed through rules. While it may be the case that professionals are expected to exercise judgment in the performance of their duties, good professionals understand that rules have a reason for being, and the default position must be to follow those rules unless there is a clear, operational reason for refusing to do so."⁴

Additionally, when we—as leaders—write our own reports, we are telling our subordinates that service before self is a great concept for them but that our careers are too valuable to risk trying it out on our own reports. This highlights "faith in the system," another component of service before self: "To lose faith in the system is to adopt the view that you know better than those above you in the chain of command what should or should not be done. In other words, to lose faith in the system is to place self before service. Leaders can be very influential in this regard: if a leader resists the temptation to doubt 'the system,' then subordinates may follow suit."⁵ Finally, AFDD 1-1 highlights the concept of duty as another component of service before self: "Airmen have a duty to fulfill the unit's mission. Service before self includes performing to the best of one's abilities the assigned responsibilities and tasks without worrying how a career will be affected. Professionals exercise judgment while performing their duties; they understand rules exist for good reason. They follow rules unless there is a clear operational or legal reason to refuse or deviate."⁶

In short, if our values are to have any lasting significance to us as an institution, we must demonstrate them in our actions. *Leaders*—and I use the term in its broadest possible sense, to include *all* Airmen—have a responsi-

bility to do the right thing and insist that our actions are consistent with our values. We must do this to ensure that the Airmen following us will not have occasion to lose faith in the system. In the context of performance reporting and promotion recommendations, this means we must not ask or allow our subordinates to draft their own documents, and, as professional Airmen and leaders worth emulating, we mustn't do it ourselves.

All the Usual Reasons

In addition to the corrosive effect that engaging in this practice has on our values, there are powerful, pragmatic arguments against it from both supervisors' and subordinates' perspectives.

Nobody Cares about Our Careers As Much As We Do

Although this statement may be true, that doesn't necessarily mean that we are the ones best able to document our performance. Left to our own devices, most of us would write about things that seem most significant to us, which are not, as a general rule, the things most significant to the usual audience for these documents (some type of central selection board). Our supervisors, on the other hand, are in a position to communicate the kinds of information a board needs to determine our potential. Let them do so.

Having Subordinates Draft Their Own Reports Is Good Writing Practice for Them

For the reason highlighted above, doing so will actually amount to *negative* training. When writing about ourselves, many of us focus on accomplishments rather than the assessments that boards find more useful. If we truly desire to provide subordinates some practice, we should consider allowing them to become supervisors in their own right. In this manner, they can gain experience in writing reports, and the supervisor can help them learn to write well without inserting his or her own performance (a matter of some emotional attachment) into the learning process.

I Have Too Many Reports to Write Them All Myself

This points to a span-of-control issue, perhaps indicating that the organization is not properly structured. We often extol "flat" organizations for their many virtues, but an ample body of practical military experience suggests that one person has difficulty adequately and directly supervising more than three to six immediate subordinates.⁷ Nevertheless, if a supervisor wishes to retain authority for writing a substantial number of performance reports, then he or she must also accept the responsibilities that accompany that authority—one of which is writing the reports. With an expansive span of control, the supervisor generally needs more robust staff support. Part of the staff's effort—usually the responsibility of executive officers or a director of staff—should focus on drafting performance and promotion documents for the boss. Alternatively, subordinate supervisors *in the chain of command* may reasonably be asked to draft these documents. For example, a group or squadron commander might draft a major's PRF for the wing commander's consideration.

My Boss Is a Terrible Writer—A Report by Him Would Ruin My Career

Even if this is true, the subordinate should still recognize that one of the responsibilities of the rater's rater is to provide a backstop for this type of shortfall. We have to trust the system—it's part of service before self. In this case, the system is personified in the supervisory chain's leaders; we must trust them to do their jobs. Furthermore, ratees must understand—and no one likes hearing this—that receiving a performance report they consider less than positive does not necessarily mean that the rater doesn't care or lacks the writing skills to produce a better report. Raters have the institutional responsibility to make the best look like the best, the worst look like the worst, and everyone else look okay. Doing so requires moral courage and frank feedback along the way. Failing to do so punishes the excellent in order to reward the mediocre. Many times, the natural result of receiving a

mediocre report with no corresponding feedback is an attempt to write one's own performance report next time around. Supervisors must not allow this to develop—no one should be surprised by his or her performance report. Honest and direct feedback is critical to building trust in our system.

My Boss Is Extremely Busy—I'm Just Helping Out

Typically offered in defense of supervisors who are senior officers, this justification is not compelling because those officers generally have staffs to help them fulfill their duties, including the documentation of performance. Senior officers—despite their pressing schedules—remain responsible for that task. Whether they choose to write the reports from scratch or ask their staff to gather inputs and prepare a first draft for their review is a matter of personal preference.

My Boss Is from Another Service and Doesn't Know How to Write an Air Force Report

Every non-Air Force organization has a designated "Air Force advisor" to assist non-Air Force supervisors in preparing Air Force performance reports and in understanding our performance-reporting system.⁸ Anyone in doubt about the ratee's, rater's, or advisor's responsibilities in the joint environment should seek out the designated Air Force advisor and ask. Members of the other services generally don't write their own performance reports and often walk away from interactions with the Air Force somewhat puzzled by our propensity to write our own reports—and to ask our subordinates to do the same.

Counterpoints to Consider

Other compelling reasons exist for not engaging in this unhealthy practice.

Self-Evaluation Often Results in a Lack of Useful Bullets

When we provide our bosses with a completed performance report—even under the fatuous guise of providing "inputs"—we

generally provide *only* a completed report without any further inputs or substantiating data. If our supervisors seriously put effort into improving the product, they are often left removing “fluff” and finding nothing with which to replace it. So they expand an existing bullet into more fluff, essentially leaving the quality of the report unchanged. By not providing an extensive menu of accomplishments with detailed results from which our leaders can choose, we essentially constrain their ability to write the best report possible.

It Reduces the Supervisor's Ownership of the Report

When our supervisors receive a completed report, they tend to believe (1) that it is the best set of inputs we can possibly provide (after all, it is our report, right?) and (2) that we would be satisfied were the report filed substantially as written. This takes a tremendous burden—that of ownership—off supervisors' shoulders. We feel this ownership most acutely when we write about our best people because we want to take care of them the best way we can. However, knowing they'd be satisfied with the report lifts the burden, and the final product isn't as good as it might have been.

It Feels Slimy (or Ought to, at Least)

When we write our own reports, we should wonder what the boss (and “the system”) really thinks of us. When something good happens to us, we should wonder if it occurred because the system worked properly or because we short-circuited it in trying to “take care of ourselves.” As the old saying goes, “There is no pillow so soft as a clean conscience.”

Some Practical Advice

Commanders and supervisors can take a number of practical steps to curtail this unhealthy practice.

Make Expectations Clear in Commanders' Calls or Organizational Meetings

There is no substitute for the involvement of leadership in solving a problem like self-evaluation. Simply expecting people to comply with the necessary instructions is not enough. Leaders need to make explicit their expectations for the organization and provide a climate in which subordinates can voice their concerns when they see disconnects between espoused values and the ones practiced.

Establish Manageable Spans of Control

The Air Force's Military Personnel Data System can provide commanders and supervisors with lists of ratees, raters, and report close-out dates that they can sort by any of the fields. A quick look at the system's report, sorted by rater, will show which ones have excessive spans of control, enabling leaders to adjust the supervisory chain accordingly. In some cases, commanders intentionally establish excessive spans of control at their level because they want their subordinates rated by their own commander (e.g., the squadron commander rates 15 officers so that all 15 can have the group commander as their additional rater). Although this may be desirable, the squadron commander (in this instance) retains the burden for ensuring that subordinates are not asked to draft their own reports.

Establish Management Systems That Force Feedback and Performance-Report Inputs throughout the Rating Period

One mechanism that has enjoyed some success involves quarterly goal-setting and feedback sessions during which raters provide structured performance feedback and compare the subordinate's performance to the goals agreed upon during the previous quarter. Subordinates come to the conversation with proposed goals for the next quarter and accomplishments for the previous one (retained for reporting purposes at the end of the rating period). The Army uses an Officer Evaluation Report Support Form to formalize not only performance expectations and objec-

tives for the rating period, but also performance-report inputs to the rater.⁹ A similar mechanism, either developed by the unit or standardized across the Air Force, could be easily implemented.

Options for Subordinates

Regrettably, many supervisors still expect their subordinates to write their own reports. In this situation, subordinates can consider several options.

Push Back

Oftentimes, when the boss asks for inputs, we assume that means "on-the-form-with-all-the-flowery-language." Perhaps just taking the boss literally is the right answer. When asked for inputs, we do just that, keeping in mind that the ones which quantify results, highlight impact, and provide some context are the most valuable. For example, "raised fully-mission-capable rates to 82 percent" means nothing unless we know that those rates were 52 percent previously. We all want the best possible report, but the most effective way to influence the process entails making sure the boss has all the data we can possibly provide—it's hard to write a good report with empty inputs. In those cases in which a supervisor asks a subordinate to "provide a draft," he or she will often back off without any hard feelings when the response is, "Boss, how about I just provide you detailed inputs? I don't let the folks working for me write their own, and I think I'd have a hard time explaining why it's okay for me to do it but not for them."

Ask Someone Else to Write It

Although many bosses will back off, some won't. One contemporary of mine made an eloquent pitch for why he shouldn't draft his own PRF and offered his boss several pages of solid inputs, only to be told, "I said 'draft your PRF.'" In cases like this, subordinates should not hesitate to ask a trusted peer or mentor to draft a performance report or promotion recommendation. Our guidance does not say that

the rater must draft his comments—only that the ratee may not. However, two circumstances demand caution. First, before submitting the report, subordinates should not edit the peer's or mentor's draft, and they should state explicitly that they are providing an unaltered draft prepared by someone else. Second, they should include a separate set of accomplishments to the rater along with the draft, giving him or her additional material with which to work. Regardless of who drafts the report, raters at all levels have sole responsibility for the content to which they affix their signatures.

As a Last Resort, Report It

Air Force instructions are clear on the practice of writing one's own performance report or promotion recommendation. A supervisor who insists that we do so (or intimates that the quality of our report will suffer if we don't) acts illegally, and this constitutes grounds for a valid conversation with the chain of command—our boss's boss. As a last resort, we can always file a complaint with the inspector general. Certainly, most of us would prefer to handle issues such as this without resorting to a formal complaint, but it beats the alternative of compromising our personal integrity as well as that of our institutional systems.

Recommendations

Aside from "don't do it" and "don't ask subordinates to do it," there are several practical recommendations to consider.

Characterize the Problem

One colonel's claim that we have an institutional problem does not necessarily make it so. Perhaps it would be helpful to include a few questions on the next Air Force institutional climate survey to characterize the extent of this corrosive practice and the reasons for its pervasiveness—if it is, in fact, widespread. Additionally, commanders at every level can add questions about this practice to their unit climate assessments to determine the extent of the practice within their own organizations.

Implement Optional "360-Degree Feedback"

Many senior officers and chief master sergeants have an opportunity to participate in leadership-development programs at various civilian institutions during which they receive 360-degree feedback as part of the curricula. In such systems, members (and, often, their supervisors) get an anonymous glimpse into how peers and subordinates perceive their behaviors and performance. All Airmen deserve these insights in order to improve. Although implementing 360-degree feedback into the formal performance-reporting system might prove problematic, making it an optional part of the process would enable supervisors to judge the effect of their behaviors. Establishing the information-technology mechanisms to enable such a process, though not trivial, would be neither difficult nor expensive. In fact the Army has an optional 360-degree-feedback mechanism in place for all soldiers.¹⁰

Guard against Institutional "Mixed Messages"

Even though a number of sources explicitly forbid self-evaluation on performance reports and promotion recommendations, no such prohibition exists regarding writing oneself a nomination for awards or decorations. Nevertheless, leaders have an obligation to ensure that our recognition systems do not rely on self-identification—not only because such actions belie the inherent responsibilities of leadership, but also because of the mixed message it sends when we expect our subordinates to self-identify for recognition programs. Though not explicitly prohibited, these expectations serve to undermine our values—self-identification for awards and decorations lies at odds with the very definition of "service before self." However, mixed messages such as "don't write your own officer performance re-

port but do write your own award" occur in other places as well. For example, the current Airmen Development Plan contains the following unfortunate admonition to Airmen who provide comments to their development team: "'Suggested Comments' for your Rater / Reviewing Official are optional, but highly recommended."¹¹ Asking our Airmen to self-assess on behalf of their supervisors sends them mixed messages about what our values look like in action. However, we can cite a great number of success stories in this regard. For instance, the Air Force's new performance report and feedback forms support both our institutional values as well as the concepts outlined in this article. Assessment-based, as well as short and to the point, the forms provide for feedback at the end of the rating period and at midterm. In short, the new processes and forms remove several of the former opportunities for sending mixed messages to our Airmen. We need only implement the processes as designed.

As leaders, we have an institutional obligation to prevent disconnects between our espoused values and our values in action, evidenced by practices such as allowing, encouraging, or participating in self-evaluation. As an institution, we have spoken about what our values are. As always, however, the challenge lies in each one of us getting up every day and conscientiously making sure that our own values are in consonance with our institutional ones and that our own actions support what we say we stand for. We are an Air Force full of Airmen who deserve the best leadership our nation can provide. Remaining true to our values establishes the foundation of the leadership that we all—from the newest Airman to our most senior officers—have a right to expect, both up and down the chain of command. □

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Notes

1. Air Force Instruction (AFI) 36-2406, *Officer and Enlisted Evaluation Systems*, 15 April 2005, 20 (par. 3.2.1.4), 103 (par. 8.1.4.1.3), 107 (par. 8.2.3.1.2), <http://www.e-publishing.af.mil/shared/media/epubs/AFI36-2406.pdf>.
2. *United States Air Force Core Values: "The Little Blue Book."* 1 January 1997. <http://www.usafa.af.mil/core-value/cv-mastr.html>. Though dated, this handbook contains valuable discussion about the meaning of the core values as well as insight into what they meant when first articulated.
3. Air Force Doctrine Document (AFDD) 1-1, *Leadership and Force Development*, 18 February 2006, 5, http://www.dtic.mil/doctrine/jel/service_pubs/afdd1_1.pdf.
4. *United States Air Force Core Values*.
5. *Ibid.*
6. AFDD 1-1, *Leadership and Force Development*, 6.
7. See, for example, Gen Sir Ian Hamilton, *The Soul and Body of an Army* (London: Edward Arnold & Company, 1921), 229; see also John S. Brown, "Spans of Control," *Army* 56, no. 8 (August 2006): 78-79.
8. AFI 36-2406, *Officer and Enlisted Evaluation Systems*, 40 (par. 3.10), 109 (par. 8.2.8).
9. Department of the Army Form 67-9-1, Officer Evaluation Report Support Form, March 2006. The Army performance-feedback form is also instructive. See Department of the Army Form 67-9-1A, Developmental Support Form, March 2006. Both forms are available at "Official Department of the Army Forms," http://www.army.mil/usapa/eforms/eforms_1.html (accessed 20 December 2007).
10. See "The Army Benchworks," <https://www.benchworks.army.mil>.
11. See "Airmen Development Plan (ADP)," <http://ask.afpc.randolph.af.mil/fdtoolkit/default.asp?prods1=1&prods2=244&prods3=2859>.



AIR FORCE MISSION STATEMENT

THE MISSION

OF THE UNITED STATES AIR FORCE

IS TO FLY, FIGHT, AND WIN...

IN AIR, SPACE, AND CYBERSPACE.

Control of Theater Intelligence, Surveillance, and Reconnaissance for the Ground Commander

MAJ STEVEN MACEDA, USAF*

I READ WITH GREAT interest Lt Col Michael Downs's article "Rethinking the Combined Force Air Component Commander's Intelligence, Surveillance, and Reconnaissance Approach to Counterinsurgency" (Fall 2008). I agree that the system needs reform but disagree with his proposal to use the close air support request process for intelligence, surveillance, and reconnaissance (ISR). Though faster than the air tasking order cycle, the joint tactical air strike request process used for close air support still does not allow the flexibility in execution required by the ground commander. Given that the Air Force has decided to apply theater ISR assets to tactical priorities, that commander must have the ability to shift those assets when priorities change. The combined air operations center (CAOC) must allow decentralized execution of ISR assets—particularly full-motion-video platforms—by delegating tactical control of platforms apportioned to Multi-National Force-Iraq (MNF-I) during execution. Doing so would speed the process of dynamic retasking and shorten the time required to respond to the ground commander's shifting priorities and time-sensitive targets.

As ISR collection manager, I see firsthand how the ground commander's operations tempo demands flexibility in ISR procedures. In particular, there is an insatiable demand for full-motion-video ISR to provide overwatch for raids as well as longer-term target-development missions. Many operations are triggered and approved only hours before execution. Neither the present planning cycle for the air

tasking order nor the process for a joint tactical air strike request works fast enough to move ISR assets to cover these operations.

All full-motion-video assets can be retasked during execution, but Army assets are more responsive than the Air Force's. The current ISR system has the combined force air component commander (CFACC) apportioning a certain number of ISR combat air patrols to MNF-I. Through Multi-National Corps-Iraq (MNC-I), these patrols are then further allocated to the various major subordinate commands (MSC) for planning purposes. For instance, my organization can rely on a particular time block on a given Predator combat air patrol and schedule the asset to cover missions during that time according to our priorities. MNC-I also controls its own ISR assets (referred to as echelons above division [EAD]), which include manned and unmanned platforms, notably Warrior Alpha and Sky Warrior—Army versions of the Predator. These EAD assets are also allocated to the MSCs for planning.

Based on the known allocation, my organization and the other MSCs attempt to schedule assets to cover as many preplanned operations as possible. Since some operations may receive approval only hours (or less) before execution, dynamic retasking of assets to cover these time-sensitive targets is common. Compared to EAD assets, CFACC assets require an extra level of approval before retasking. At best, this is a minor annoyance to the ground force; at worst, it can cause an asset to arrive on target after an as-

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sault has begun, missing the most critical portion of the operation.

When a time-sensitive target calling for dynamic retasking arises, the MSC collection manager receives an ISR request from the tactical unit, weighs the new request against existing priorities, and may direct an asset to the new mission location. Retasking an EAD asset already allocated to the MSC by MNC-I follows a simple procedure: the MSC simultaneously notifies MNC-I of the impending move and passes the new target information to the ISR mission commander; the asset then moves to the new location. This rapid retasking is possible because the MSC collection manager knows the command's priorities and can determine if the new operation warrants moving the asset from another mission.

Occasionally, MSCs request EAD assets to cover operations outside their allocated coverage times. In these instances, the requesting command works through MNC-I to coordinate shifting an asset from another MSC. If the latter does not wish to relinquish control of the asset, the MNC-I chief of operations can make a decision on relative priority. After MNC-I approves reallocation, the requesting command can direct the asset to the new mission.

Retasking a CFACC combat air patrol to accommodate an MSC involves a similar process, but navigation of another level of bureaucracy adds to the time expended. Requesting assistance from a CFACC asset that supports another MSC requires MNC-I's approval—a sensible prerequisite because it involves weighing priorities between different units. The CAOC must then approve the change as well. Though sometimes done quickly, this process often results in delays of 10 minutes or more. Even when an MSC wants to shift an allocated CFACC asset between MSC missions, both MNC-I and the CAOC

must sanction the change. This delay wastes precious time—after all, the asset has already been apportioned to MNF-I and allocated to the MSC. If the latter's priorities change during execution, it should be able to shift the asset to a new mission—of course, keeping MNC-I and the CFACC informed of the move.

Certainly, the CAOC needs to know where its assets are flying and, as Colonel Downs says in note 27 of his article, must prevent changes from affecting the availability of aircrews or aircraft. Having already apportioned certain assets to MNF-I (and from there down to the MSCs), however, the CAOC is not adequately positioned to judge the ground commander's priorities. Execution authority (tactical control) should pass with apportionment to MNF-I during the scheduled mission time. Extensions beyond planned coverage windows (e.g., late return to base) should remain subject to the CAOC's approval. Within the apportioned windows, however, those commanders closest to the fight should employ the assets. The CFACC should remain informed yet stand outside the normal approval process, intervening only by exception. Having already made the decision to apportion full-motion-video combat air patrols to MNF-I, the CFACC should pass tactical control during the scheduled windows as well. Doing so would give the ground commander maximum flexibility with the assets the CFACC has already decided to apportion. Meanwhile, keeping the CFACC informed of movements would enable intervention in the rare case when an asset is asked to exceed crew- or aircraft-availability requirements. The half measures currently in place only slow the process of shifting assets and delay fulfillment of ground commanders' ISR requirements. Using joint tactical air strike requests to task ISR will not effectively close this gap. □

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Editor's Note: PIREP is aviation shorthand for pilot report. It's a means for one pilot to pass on current, potentially useful information to other pilots. In the same fashion, we use this department to let readers know about items of interest.

Developing Airmen for Integration into Air, Space, and Cyberspace

The New Aggressors

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REVITALIZATION OF THE aggressor program provides expanded training opportunities in the air, space, and cyber realms. The following discussion details basic principles of the aggressor program, developed over time by organizations whose express objective has been to expose weaknesses in current systems and tactics in order to improve them. The article then looks to the future as the aggressor program integrates space and cyber capabilities into its existing activities involving air and air defense.

With the current pace of operations, training for the full spectrum of conflict has in large part given way to the need to focus on today's battle—as it should. High-end training opportunities are limited for any number of reasons, but at some point in the future, we will likely need to employ in major combat operations, bringing to bear technological advantages the United States has developed and maintained over the years. But the US Air Force cannot attribute its success during the last 61 years only to superior technology; in

fact, we can blame dependence on technology during the Vietnam War for higher-than-expected attrition in the air. Rather, the way the Air Force employs technology has enabled the service to stay ahead of its adversaries. Effective, realistic training prepares Airmen to use their weapons systems in expected roles and missions; it also prepares them to deal with the unexpected. Such training teaches them not what to think, but how to think, react, improvise, adapt, and overcome.

The opposing force (OPFOR or "Red"), "the stone upon which the Air Force hones its combat skills," constitutes a key component of realistic, meaningful training.¹ If the OPFOR presents an outdated, unrealistic, or otherwise nonrepresentative threat, then Airmen learn the wrong lessons or don't learn at all. Giulio Douhet's observation that "victory smiles upon those who anticipate the changes in the character of war, not upon those who wait to adapt themselves after the changes occur" may be true, but beyond solid preparation, one must also be able to deal with the unexpected.² A valid OPFOR assesses the present and looks to

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the future to anticipate and replicate the next threat, and it does so independently of the mainstream or "Blue" forces. In doing so, it both prepares Blue for what's coming next and develops tactical flexibility as Blue forces, executing established tactics, techniques, and procedures (TTP), learn to adapt them to the unique problem presented. Foundational tactical training has to develop a baseline from which we can adapt, improvise, and overcome. The reinvigorated Air Force aggressor program, dedicated to analyzing and presenting current and emerging adversary systems and tactics, offers tactical problems that reinforce baseline training as well as develop flexibility and stimulate thought.

The aggressor program has provided combat air forces (CAF) this high-end training for the last 36 years. The program stood up in 1972 during the final phase of the Vietnam War, when the vaunted technological and tactical superiority of American fighters and pilots netted a depressing 2.4:1 kill ratio, decreasing at one point to parity as F-4 Phantoms and F-105 Thuds traded shots with Communist MiG-19 Farmers and MiG-21 Fishbeds.³ Although we now accept the OPFOR as a means of providing positive training, in 1972 the concept of dedicating units exclusively to studying/teaching enemy tactics in jets similar to MiGs was fraught with risk—at a time when risk mitigation was the watchword. To fly dissimilar air combat training was to invite disaster. CAF leadership held that pilots who had trained exclusively against their own fighter types would dangerously mishandle faster or more agile adversary aircraft, resulting in loss of control or midair collision—bent metal and dead aircrews.⁴ Today, the benefits of this sort of training are a given: dissimilar air combat training is necessary to prepare aircrews to fight the ultimate in dissimilar aircraft: those of real-world adversaries.

Initially, aggressors' offers to travel to a host base to fly and teach elicited a tepid response: "At the time accident rates in the tactical air forces were high. 'Wing commanders were scared to have us come.'" "A bunch of guys [from] Nellis" not only would drive up accident rates even higher but also would invite

greater scrutiny. If a unit performed poorly, its leaders feared that the aggressors would keep track and report their findings up the chain of command. But in 1973, the F-4 training unit at Homestead AFB, Florida, agreed to host the new 64th Aggressor Squadron's (AGRS) pilots and their T-38s, aircraft that approximated MiG-21s in size and maneuverability.⁶ The first "Aggressor Road Show" sought to present a realistic replication of MiG capabilities and tactics observed in Vietnam, tailoring it to the audience and thus enabling student as well as instructor F-4 crews at Homestead to learn from trial and error, minus the threat of real missiles and bullets. Thirty-five years later, fighter wings are eager to have the aggressors visit—in some ways, tactical execution becomes simpler when crews fight dissimilar platforms (because fighting against similar aircraft complicates the beyond-visual-range and within-visual-range identification process). Aggressor training also brings with it the element of the unknown, which challenges and hones an aircrew's adaptability.

Valid Training?

Eleven years after the Homestead AFB road show, Maj Gen Eugene Fischer, commander of the Air Force Tactical Fighter Weapons Center at Nellis AFB, Nevada, assembled all of the 64th and 65th AGRS pilots, berating them for the unprofessional behavior of a number of the flyers.⁷ The aggressor Class A (loss of life, loss of aircraft, or damage in excess of \$1 million) accident rate had skyrocketed in 1984 to 22.9 events per 100,000 hours of flying; between them, the 64th and 65th had crashed five F-5 aircraft in a year's time. Without the aggressors, Tactical Air Command's (TAC) accident rate was 1.9, roughly the same as today's.⁸ The establishment's worst fears had been realized—instead of making the Air Force stronger, the program was actually decreasing the service's capability. Mechanical malfunction accounted for only one of a spate of accidents; the others resulted from pilot error. The aggressors prided themselves in selecting the best stick-and-rudder pilots available, so the

accidents weren't due to a lack of pilot skill. Instead, General Fischer focused on the pilots' motivation, narrowing the problem to attitude—the development of an egocentric “win at all costs” approach to the aggressor mission. Despite existing for the sole purpose of providing high-fidelity training to operational flying units, the aggressors had developed a reputation as “cowboys” who bent or broke rules in the name of teaching aircrews by “punishing errors.” On the one hand, their charter called for presenting an adversary tough enough to challenge the Blue force and improve its tactical skills. However, one could always find intelligence to rationalize this “Nellis freestyle” approach to adversary support, one that contributed to the win-at-all-costs mindset.⁹ On the other hand, although the aggressors presented a challenging threat, it had grown increasingly unrealistic—the desired end state had become defeating Blue, not making Blue better.¹⁰

In 1990 the aggressor program found itself in trouble once again, this time due to shrinking budgets. During the post-Cold War budget-prioritization debate, fiscal pressures overcame the value of the program. Because the aggressors could not provide adversary support to all fighter units at once, wings continued to train internally, using their own aircraft and pilots to simulate the threat. This practice continues today: tactics manuals give guidance on how to replicate adversary aircraft, weapons, and tactics, but operational aircrews who support Blue training as Red Air do so to the detriment of their own Blue skills. Consequently, Air Combat Command (the follow-on to TAC) limits the number of Red Air sorties aircrews can use as credit toward annual training requirements.¹¹ As Blue equipment and missions become increasingly complex, pilots find it more difficult to invest the time required to learn and properly execute emerging adversary tactics. However, from a purely programmatic perspective, it costs less to add sorties to existing flying-hour programs for operational units to use as Red Air than to stand up and support dedicated adversary squadrons.¹² With this in mind, the Air Force closed F-5 aggressor units in Pacific Air Forces

and US Air Forces in Europe (the 26th and 527th AGRS, respectively) as well as the 65th AGRS at Nellis. The 64th AGRS was drawn down to a flight-sized unit with six authorized F-16s and 10 pilots and then subsumed by the 414th Combat Training Squadron (Red Flag).¹³ This professional core unit would train aircrews on temporary assignment to Nellis to augment the Red Air presentation during Red Flag exercises and USAF Weapons School support. Although this arrangement permitted a numerically challenging threat picture, the part-time aggressors did not have the same grounding in tactics as did the professionals, so in the end, the value of training decreased.

In 2003 Gen T. Michael Moseley, vice-chief of staff at the time, reinvigorated the aggressor program at Nellis, renewing the 64th AGRS and initially expanding it to a primary aircraft authorization (PAA) of 12 F-16s (eventually increasing to 24 in 2009).¹⁴ In 2006 he reconstituted the 65th AGRS, this time in F-15C Eagles with upgraded radars and avionics. Whereas in the past, the aggressor program simulated the threat with older, less-capable Air Force fighters to reduce costs, upgraded F-15s enabled the squadron to accurately replicate fourth-generation fighters of the former Soviet Union. Flying-unit deactivations made the F-15s available, and experience gained from training against the former Soviet Union's modern fighters, flown by countries such as Germany, Malaysia, and India, drove home the reality that we cannot ignore near-peer air forces—that aggressor replication needs to include the most dangerous potential opponents. In many ways, the 65th AGRS's F-15s are technologically more capable than some operational Eagle squadrons.

At the same time, the aggressor program expanded to bring all air and air defense (for brevity this article refers to both as “air”), space, and cyberspace aggressor activities under one roof as part of the 57th Adversary Tactics Group (ATG), which includes the 547th Intelligence Squadron, thus continuing the hand-in-glove relationship between aggressors and intelligence. Likewise, every other squadron in the ATG includes intelligence personnel who help focus the collection of information

and conduct research. An important element of the aggressor program is the close relationship between operations and intelligence—all aggressor operators are schooled in intelligence capabilities and limitations, spending a significant amount of time studying the adversary.¹⁵ With continuous exposure to operations, intelligence officers and enlisted members acquire a much better appreciation for the efforts they support than they get elsewhere. Since its inception, the aggressor program has capitalized on integrating otherwise separate disciplines.

The ATG continues in this mold today; part of its charter involves integrating all aggressor activity in the air/space/cyber domains under one centralized, independent organization in order to present the most threat-representative adversary possible. Doing so will enable the ATG to present a coherent, realistic air/space/cyber picture of the adversary. An active, professional aggressor program allows operational units to concentrate on honing their tactics without the additional burden of deploying to Nellis to provide adversary support to the Weapons School and Red Flag. The ATG concept enables high-quality, accurate, and predictive threat training. It also has the potential to pay for itself as it assumes responsibility for all adversary support for the Weapons School, the 422nd Test and Evaluation Squadron (TES), and Red Flag at Nellis, saving combat-coded units from having to deploy there to provide such support.

With noted exceptions, the aggressor program has demonstrated continued improvement for the last 36 years, expanding from its small-scale proficiency to today's ability to challenge more than 80 aircraft in a Red Flag scenario. Hard lessons, such as those learned in 1984, have become imprinted on the aggressor program and continue to have relevance in this most recent era of expansion. The following review of the three most important lessons from the past applies to the air, space, and cyber domains; keeping them in mind will help the program stay on track as it continues to grow and adapt.

Win-at-All-Costs Mentality

General Fischer delivered his severe critique of the program in 1984 as a reaction to a corrosive win-at-all-costs attitude that eventually led to the aggressors' losing sight of their primary purpose—to serve as a training aid for Blue. Having existed for nearly 12 years, the program enjoyed the luxury of hand-selecting highly experienced and capable pilots—an essential level of expertise. If it seemed difficult to execute Blue tactics in modern aircraft, it proved doubly so to replicate Red tactics in significantly less capable T-38s and F-5s. In hindsight, this combination of substandard aircraft, restrictive tactics, and pilots selected for their outstanding flying records (individuals used to winning) led to an egocentric attitude. Dying for a living goes against everything that combat aircrews learn in training—from the very start in defensive basic fighter maneuvers, pilots are told to “never give up.” Even the most mature aggressors still react viscerally when referred to as “dead” in an exercise.

Preventing aggressors from slipping back into the win-at-all-costs mentality takes careful selection, strong squadron leadership, and continual emphasis that “we’re here to train Blue—if Blue wins, we all win.” It also requires a high level of maturity to find satisfaction in acting as a combat-training aid. Ed Clemons, charter member of the 64th AGRS, put it this way: “The best possible feeling for an aggressor was to come back from a flight out of breath, tired, and sweaty, knowing he used every tactic, employed every advantage he knows, and still did not come away with a ‘kill.’”¹⁶ The current ATG selection process allows the group's leadership to handpick the best qualified people from the pool of CAF instructor pilots and experienced four-ship flight leads during each assignment phase, in an effort to find pilots with the right balance of skill and maturity.

Based at Nellis AFB, the aggressors are surrounded by Weapons School instructors, weapons upgrade pilots, and operational test pilots from the 422nd TES. The pressure to measure up is significant—continuously losing training engagements has the potential to leave aggressors looking for opportunities to demonstrate

their own skills that set them apart from their peers in the selection process. Left unchecked, this understandable but unacceptable attitude can lead to unprofessional execution and increased risk, as occurred in 1984. When aggressors are allowed to feed their egos, bad things happen. Prevention starts with the selection process—stick-and-rudder skills are important, but a mature attitude is mandatory.

Squadron leadership offers the second antidote to the win-at-all-costs mentality. Supervisors can identify deviations very early in the process of an aggressor's loss of focus. The key entails actively soliciting feedback from those who use the aggressors as training aids. Violations of training rules should always merit attention during debriefs. Even if Red flight members don't report violations to their supervisors, these events are not quickly forgotten by Blue. AGRS supervisors need to develop and sustain a relationship with their Weapons School, 422nd TES, and Red Flag peers to maintain awareness of pilot performance and then follow up on violations. As the self-professed "keepers of the training rules," leaders must address any violation. Failure to do so allows squadron members to start down a slippery slide toward unprofessional behavior.

Finally, aggressors need constant reminding that, regardless of whether they win or lose, they win. If they design and execute realistic adversary replication perfectly and if Blue fails to manage the problem appropriately, then the aggressor pilots can employ weapons and kill Blue assets. The experience will burn the lesson into the Blue pilots' psyche as they make the long, lonely dead-man's journey back to Nellis. During debriefing, the threat expert then has the opportunity to explain the origins of the tactic and the weakness it sought to exploit. Blue pilots win when they internalize the painful lesson, and Red forces enjoy the satisfaction of executing their tactics properly and winning.

Happily, this scenario has become increasingly rare, yet Red still wins even when Blue wins. Keeping in mind that the aggressor's mission is to make Blue better, Red derives satisfaction from executing that mission properly and cheering Blue on as it solves the problem

presented. But this requires a constant mantra of "when Blue wins, we win; when Blue wins, we win" as the aggressor is "killed" and returns to the regeneration airfield to do it all again. By selecting skilled, mature pilots; by keeping a close eye on training-rule infractions; and by continually reminding pilots that in this business getting beaten is a good thing, we can assure that aggressors avoid the win-at-all-costs trap.

This process applies to space and cyber aggressors as well. Both domains are still working through the execution of tactics in an unopposed setting; we must closely tie adversary involvement to distinct objectives associated with known vulnerabilities. Just as the first aggressor road show to Homestead AFB saw Red significantly altering tactical replication to meet student training objectives, so must we limit and focus aggressor activity in the growing worlds of space and cyber. At best, "win at all costs" in these nascent disciplines will prove counterproductive; at worst, it could set fledgling efforts such as network operations back markedly.

Ossified/Unrealistic Tactics

Even if aggressor squadrons use only the most qualified pilots with perfect attitudes, ossified, rigid Red replication and unrealistic tactics can also detract from their ability to prepare Blue for the next battle. By far the most difficult aspect of the professional adversary mission is keeping up with the development of adversary tactics. Whereas enemy systems improve over time, technology is limited by physics and cost; by leveraging intelligence collection and current scientific knowledge, the ATG's threat-assessment processes have proven able to accurately assess how far a given technology can advance in the next five to eight years.¹⁷ Armed with this knowledge, aggressors can modify systems/weapons/airframe employment to replicate adversary technology with a high degree of fidelity. With higher-echelon support, the ATG has enjoyed considerable success in acquiring threat-representative equipment.

Tactical replication presents a very different problem since the development of tactics is limited only by the imagination. How an adversary chooses to employ his technology var-

ies widely across nations/cultures. Highly hierarchical cultures typically dictate tactics to aircrews through rigid command and control architectures. More liberal cultures tend to delegate tactical decision making to lower levels, allowing more flexible, responsive execution. Tactics have infinite possibilities; that is, even closely linked allies who operate similar systems—referencing the same tactical doctrine—develop and execute noticeably different tactics.¹⁸ One can imagine the difficulty in observing and documenting these tactics in insular, closed societies. When charged with “accurate threat replication,” the aggressors face a dilemma: is it possible to know how an adversary is going to react in combat? And even if they do manage to find a source for this data, with so many potential adversaries, which do they replicate? Aggressors seek to design tactics that resemble those observed in real/potential adversaries, but this is an imperfect science at best.

Accurate threat replication therefore requires constant study and adjustment to prevent tactics from becoming rigid and dogmatic. It also demands that pilots understand the culture they seek to replicate, an endeavor that has recently received additional emphasis.¹⁹ The “Aggressor Threat Replication Guide” delineates tactics that duplicate observed Soviet tactical behavior as well as postulated country-specific modifications, based on intelligence and the impact of improved systems capabilities (active missiles, improved radars, data links, etc.). The simplicity of the bipolar world allowed the United States to focus on Soviet tactics; today the problem set has grown significantly.

Taken to the extreme, this situation argues for nearly infinite tactical possibilities, depending on culture, weapons systems, and scenario. For the aggressors, replication means little if it does not serve to prepare Blue for a wide array of potential combat scenarios; oftentimes, however, completely realistic replication takes a backseat to part-task training, which produces yet another variable—Blue training objectives. Three units at Nellis AFB illustrate this well. In order to develop the most effective Air Force systems and tactics, the 422nd TES requires pristine threat systems

and tactics replication. Blue systems vulnerabilities identified during test and evaluation are remedied before the fielding of radars, jammers, and weapons in operational units. The 422nd also requires the most representative Red tactics the aggressors can muster as it assesses the effectiveness of new Blue systems and tactics.

The opposite is true of the Weapons School, where attaining accurate threat replication is less important than achieving “Desired Learning Objectives,” also the title of a graduate-level course. In this course, replication requirements vary as mission complexity grows from one-versus-one aircraft maneuvering to multi-formation package operations. Weapons School instructor pilots frequently request nonrepresentative formations/execution, seeking to test upgrading students’ situational awareness and comprehension of Blue tactics.

On the “replication versus training” spectrum, the Red Flag audience lies somewhere between the 422nd TES and the Weapons School. On the one hand, Red Flag scenarios demand accurate threat replication to validate the execution of large force-employment packages, but that must be tempered by the requirement to train not only the air-to-air escort aircraft on the leading edge of the package but also the bomb droppers following 30 miles behind them. Perfect replication would result in training for only a few flights in the package, while perfect training would overwhelm the mission commander’s plans, resulting in mission failure. During Red Flag, adversary tactics are adjusted to both validate Blue tactical execution and provide training to as many participants as possible.

All this is to say that aggressors walk a fine line between falling back on known, comfortable 1980s Soviet tactics and starting down the slippery slide of Nellis freestyle, designing tactics that initially challenge Blue but eventually become unsolvable, hindering valid training. Aggressor tactics need to be finite but adaptable, threat representative but challenging, and culturally informed. That’s a tall order. By actively soliciting feedback from Blue, aggressors can ensure that presentations meet training and/or replication requirements. Although

Blue may debate a new tactic's viability (especially if it works), an ongoing dialogue will serve to explain the thought process behind the tactic and guarantee that threat presentation meets the training need. The tactic has to be anchored in reality, but it can't become so rigid as to stifle Blue's learning. Ideally, aggressor tactics will always drive Blue forces to deal with a slightly different problem, keeping them flexible and improving their ability to adapt to new situations.

Because of their constant engagement in real-world operations, the space and cyber realms are far less susceptible to the problem of ossified aggressor tactics. Additionally, adversary capabilities and intent in these domains remain largely unknown. No one could possibly misinterpret enemy fighters attacking friendly aircraft and territory, but in the world of space operations, blue-on-blue interference and adversary jamming are often indistinguishable. This goes double for network operations; the spectrum of possible adversaries ranges from teenage hackers to nation-states, each employing different tactics. However, as aggressor programs for space and information mature, they too will develop workable tactics and must stay mindful of the need to continually challenge Blue's flexibility.

Failure to Show Value

An environment characterized by shrinking resources threatens any activity that appears to be underperforming, whether it's a new system or an established organization. Underperformance comes in many forms, some perceived, some real, but when the time comes to prioritize a program during resource allocation, both hard facts and perceptions about it are weighed against those of other programs. A line is drawn, and those activities that don't make the cut don't get fully resourced. Because aggressor contributions are difficult to quantify (about the only hard fact available is travel costs saved by no longer having to deploy units to Nellis to support Weapons School, test, and Red Flag adversary support—about \$7 million in 2007), the aggressor program stays at risk.²⁰ Currently a high priority, the

ATG program has adequate resources and has provided tangible benefit to operational units. September 2007 saw the first AGRS road shows in seven years (the 64th AGRS to Eglin AFB, Florida, and the 65th AGRS and 507th Air Defense Aggressor Squadron to Shaw AFB, South Carolina). The 33rd and 20th Fighter Wings warmly received these units, which provided dedicated adversaries and boosted threat awareness through detailed academics covering current and emerging threats. Having a unit offer dedicated professional dissimilar adversary support with well-studied tactics and specialized equipment (i.e., electronic jammers) takes an enormous burden off operational squadrons, but the impact is difficult to quantify in fiscal terms.

With the potential of overpromising and underdelivering adversary support, the ATG must manage expectations. Still in the growth phase, it will reach full capability in 2011. In the interim, the danger lies in raising expectations without enough people or equipment to satisfy them. Once the 64th and 65th AGRS reach 24 PAAs each and the 18th AGRS at Eielson AFB, Alaska, completes its conversion to 18 PAAs (Block 30 F-16s), sufficient capability will exist to cover all adversary requirements at Nellis, as well as to visit every fighter unit in the continental United States, Pacific Air Forces, and US Air Forces in Europe once a year for two weeks (including formal training units at Tyndall AFB, Florida, and Luke AFB, Arizona).²¹ Additionally, the 527th and 26th Space Aggressor Squadrons will be able to support satellite communications (SATCOM) jamming for Air Force Space Command's operational, test, and training requirements, as well as make training available in jamming the global positioning system (GPS) to flying and other units, mostly during Flag exercises. They will also provide support during road shows. Finally, the 57th and 177th Information Aggressor Squadrons will offer training in network attack and defense to Air Force Cyber Command network operators, with the potential to continue the current effort to educate individual users through focused network-vulnerability road shows at the base level.

The aggressor program will soon claim an operational wing's complement of combat-capable aircraft, an air defense aggressor squadron, two squadrons of space aggressors (with GPS and SATCOM jammers), and two information aggressor squadrons—quite a bill to pay for specialized training. Because it is a new initiative, the ATG enjoys the benefit of the doubt during the stand-up phase. Over time, should it fail to continuously demonstrate value for the investment, the group could again face the same programmatic axe it did in 1990.

Looking Ahead: Integration and Operational-Level Support

Because the Air Force moved all air/space/cyber training under the ATG program, the benefits of flying-aggressor lessons over the years have been actively integrated into the activities of space and cyber aggressor squadrons. Interestingly, the 1970s-style "safety first" training mentality that made the first aggressor road show so unpalatable to TAC units is apparent in space training today. Mistakes made during past training events received high-level scrutiny—the fixes have had the effect of making realistic training too hard to do. This situation resembles the one that existed as the Air Force (and Navy) conducted operations in Vietnam. That is, the services considered dissimilar training too dangerous to practice in peacetime; the impact on wartime performance is a matter of record. The aggressor experience highlights the need for more frequent and realistic live training, not less. Unfortunate mistakes occurred early in the flying-aggressor program (resulting in the "Cancer of TAC" speech of 1984, previously mentioned), but the overall effect over time has been to reduce accidents and improve capability. Space aggressors have steadily advocated the delegation of SATCOM jamming authority down to levels low enough to allow timely, effective training. The more that units practice their expected wartime missions, the lower the probability of errors.

The fledgling aggressor effort for space and cyber has patterned itself after three de-

acades of flying-aggressor experience. This has proven a sound approach during the stand-up period, but as these disciplines mature, it becomes increasingly clear that each will develop its own unique attributes. Despite their differences, the ATG charter calls for presenting the "complete enemy target set" in various stages of integration. Depending on the scenario, air/space/cyber will sometimes act independently, sometimes in unison, leveraging each other's strengths to compound the problem for Blue. For example, in a recent exercise, Blue forces compromised key position and timing information on air packages through sloppy operations-security procedures. The info aggressors secured the sensitive data (the objective is to make US and coalition forces stronger, not more vulnerable) and then passed it to the air and air defense aggressors, who decimated the lead fighters in the package. It remains to be seen to what degree real and potential adversaries are developing the ability to integrate effects, but the ATG's mission involves anticipating changes in the character of war—integration of air/space/cyber effects is coming in some form.

A noteworthy feature of the ATG—its integration of air, space, and cyber disciplines at the squadron level—enables it to innovate and experiment without excessive coordination. Because of the organization's relatively small size (500 people), each discipline can learn extensively about the others. Air and air defense aggressors coordinate their tactics with the space aggressors' GPS jamming and, in the process, learn about other space endeavors; meanwhile, space aggressors gain valuable exposure to air operations, broadening them for follow-on assignments in their field. Although air, space, and cyber professionals tend to be stovepiped in the broader context of the Air Force and Department of Defense, the small size of the ATG encourages ongoing interaction at this level. Lessons from this interaction have yielded positive learning well beyond Nellis's gates.²² Additionally, even though air and space work independently and jointly in their fairly narrow aggressor realms, information operations appear to hold the key to all integration efforts in the age of information-

enabled warfare. Information aggressors have interacted with everyone in the group, making believers of them all. Once the ATG's individual air/space/cyber operators become fully aware of the capabilities of the other domains, the results will be impressive.

Before becoming an aggressor, one must obtain an "instructor pilot" level of expertise in a particular realm. Although aggressors spend most of their time studying, teaching, and replicating adversary systems and tactics, they also rely heavily on their Blue experience to know which adversary capabilities will provide the most realistic training. This depth of experience is shared across domains in courses such as Aggressor 101 (Introduction to Adversary Tactics—a broad look at the entire aggressor program, taught at Nellis and required of all ATG members) and follow-on training, such as AGRS 202, 303, and so forth. Squadron commanders should be able to give each other's mission briefs, an effort to keep aggressor leaders mindful of their role in presenting the greater enemy target set.

Although the ATG effort will be self-limiting in order to replicate observed and realistic near-term adversary capabilities, growing integration will certainly produce lessons that can accrue to broader cross-domain efforts in the Air Force. Again, ATG members' firsthand experience operating in the air, space, and cyber domains will enable them to better understand how these can combine to challenge Blue with likely future scenarios in various exercise and experimentation venues (Virtual Flag, for instance). Just as importantly, the experience will also inevitably reveal strengths and weaknesses associated with increasing integration. The ATG will capture and transmit these lessons through mechanisms such as tactics conferences and USAF Warfare Center publications for greater Air Force use outside the ATG.

Beyond the integration of tactical-level effects exists the possibility of moving this training to the operational level. Aggressor squadrons specialize in creating tactical effects that have already seen use in operational-level exercises such as Virtual Flag to provide realistic and at times unexpected adversary scenarios. Although

it might be possible to use the ATG's combined knowledge of adversary capabilities and intentions to effectively train operational-level organizations such as air operations centers and air support operations centers, this would cross into the realm of "red teaming"—clearly not in the ATG charter.²³ However, the ATG could coordinate with organizations that already do red teaming (e.g., the Air Force Research Laboratory and the Agency for Defense Analysis) to make training at the operational level of war as realistic and meaningful as possible.

Conclusion

Today's expanding Air Force aggressor program is built on 36 years of valuable, sometimes painful, experience that will advise the development of integrated air, space, and cyber training. Not every lesson from the past will apply to space and cyber aggressors, but hard-learned, universal aggressor "laws" do exist. Allowing aggressors to slip into a win-at-all-costs mentality, failing to keep up with recent developments and settling into comfortable but ossified tactics, or forgetting the wider Air Force/joint audience and thereby failing to show value would quickly undermine the program. Current ATG TTPs include a multitude of other lessons: pitfalls such as taking on an assessment role (one of the factors that made the first aggressor road show undesirable), attempting to teach Blue forces their own tactics, or developing exceedingly difficult tactics that replicate a threat which doesn't exist.²⁴ These apply not only to the flying program but also to all aggressor domains. Yet, the space and cyber aggressors will develop their own domain-unique lessons that they will need to incorporate into their own TTPs and then share with the other domains to ensure that integration doesn't create problems.

The primary ATG focus in this regard entails maintaining a spirit of continuing evolution, driven by ever-increasing knowledge of the adversary's technology and tactics. Closely linked to Air Force and national intelligence activities, members of the ATG take pride in their ability to "know, teach, and replicate"

the adversary as one of only a few Air Force organizations specializing in breaking down barriers between operations and intelligence. This culture of continuous revalidation (the "know" of "know, teach, replicate") makes the program well suited to taking the next step in high-fidelity training—integrating, expanding, and increasingly overlapping air, space, and cyber capabilities. Whether aggressors provide a two-ship formation of Red Air for supporting upgrade training at Shaw AFB or combine air, space, and cyber effects to train a widely dispersed Virtual Flag audience, the focus remains on valid, realistic training to prepare the Air Force for future warfare.

Notes

1. Brig Gen Steve Hoog to the author, note, 25 January 2008.

2. Giulio Douhet, *The Command of the Air*, trans. Dino Ferrari (1942; new imprint, Washington, DC: Office of Air Force History, 1983), 30.

3. Dr. Richard P. Hallion, "A Troubling Past: Air Force Fighter Acquisition since 1945," *Airpower Journal* 4, no. 4 (Winter 1990): 4, <http://www.airpower.maxwell.af.mil/airchronicles/apj/apj90/win90/1win90.htm>; see also Maj Michael P. Donovan, "Full Circle? The Transformation of Dedicated Adversary Air Training in the USAF" (thesis, School of Advanced Airpower Studies, Maxwell AFB, AL, 1998), 10.

4. Gen Bruce K. Holloway, "Air Superiority in Tactical Air Warfare," *Air University Review* 19, no. 3 (March–April 1968): 8–9, <http://www.airpower.maxwell.af.mil/airchronicles/aureview/1968/mar-apr/holloway.html>. Tactical training in the 1960s focused on Cold War nuclear employment: air superiority training took a backseat to flawless execution of the nuclear war plan. Furthermore, as Holloway says, this reluctance to train against realistic adversaries "was partly a reflection of concern for flying safety" (9). This "safety first" theme came up repeatedly during interviews with pilots of that era.

5. Reina Pennington, "Grounded: The Aggressor Squadrons," *Air and Space*, March 1994, 28.

6. *Ibid.*

7. Maj Gen Eugene Fischer, "The Cancer of TAC" (speech, Nellis AFB, NV, 7 September 1984, transcript of an audio recording).

8. For comparison, the CAF's 2007 Class A rate was 2.69, and 2006's was 1.74 (as was 2005's). "Flight Safety Statistics," <http://afsafety.af.mil/stats/0711tstats.txt>. For Air Force-wide rates, see "USAF Flight Mishap History, CY47–FY06," <http://afsafety.af.mil/sef/stats/USAF%20Flight%20Mishap%20History.pdf>.

In the end, the aggressors aren't Red but a deep shade of Blue, gearing all their effort toward training Blue forces and making them better. Growing dependence on a shrinking CAF fleet as well as the metamorphosis of space and cyber from supporting to supported combat roles means that full-spectrum, integrated aggressor training will become increasingly important as time goes on. "Enemy air-to-air successes during the Vietnam conflict led to the establishment of the first Aggressors in 1972. It should not take another . . . Project RED BARON type-report, generated from US combat losses, to serve as the catalyst for Aggressor training advocacy in other domains."²⁵ □

9. "Nellis freestyle" refers to using one's knowledge of Blue forces' capabilities and limitations to defeat them. Although replicating an adversary's potential technology is a finite problem, replicating his tactics is a limitless challenge. An undisciplined AGRS program can claim that any tactic is valid (observed or postulated to be employed by known adversaries), but truly valid tactical replication depends on the strength of the group's leadership and the proper attitude of its pilots.

10. To be completely fair, transition from the F-4 to the revolutionary F-15 contributed to this apparent departure from pure replication. Whereas unsophisticated F-5s could challenge F-4 crews with Soviet tactics, the vastly improved F-15 radar and fire-control systems made what were once challenging threat presentations easily solvable. The aggressors felt the need to challenge the incredibly capable F-15s with tactical problems to match. In some cases, this led to pilots flying their F-5s beyond the jets' and the pilots' capabilities, resulting in accidents. This situation bears watching today as the F-22 comes online and the aggressors seek to challenge this highly effective platform in order to prepare Raptor units for future combat.

11. This guidance is spelled out in Headquarters ACC/A3's annual Ready Aircrew Program Tasking Message.

12. After the AGRS drawdown, a former aggressor said, "One way the Air Force is compensating for closing down the Aggressor squadrons is by having operational wings train against each other" (Pennington, "Grounded," 36). Although training was less expensive, quality suffered as Blue units reluctantly assumed Red roles on a one-for-one basis. Donovan notes that "even when engaged in [dissimilar air combat training] with non-dedicated adversaries . . . practicing US versus US tactics leaves a dangerous gap in threat knowledge, and may prove to be negative training in the end" ("Full Circle?" 25).

13. Pennington, "Grounded," 35.

14. "ATG Enabling Concept" (Washington, DC: Headquarters US Air Force, 2004).

15. Boots Boothby, original commander of the 64th AGRS, "remembers telling the commander of Tactical Air Command that there was 'a huge wall between operations and intelligence. And the reason it's there is because no fighter pilot was ever going to admit there was something he doesn't know'" (Pennington, "Grounded," 30). One cannot overstate the synergies that come from teaching flyers about intelligence (and vice versa).

16. Quoted in Pennington, "Grounded," 32.

17. The Emerging Threat Tactics Team (ET3) process has proven very useful in proactive threat assessment. By bringing intelligence professionals, operators, engineers, scientists, and think-tank researchers together, the ET3 has been able to assess observed adversary activity and then postulate where this technology might lead in five to eight years. By looking forward, the ET3 enables the acquisition and test communities to better prepare for the future.

18. For example, a Dutch exchange officer at Shaw AFB, SC, approached air combat maneuvers and air combat tactics differently than his American hosts. During air combat maneuvers, USAF pilots considered the aircraft that merged with the adversary to be the "engaged" fighter. The nonengaged fighter's job is to shoot missiles at the lone adversary but stay out of the fight in order to prevent midair collision between Blue fighters. Interestingly, the Dutch approach was to identify the nonmerged Blue fighter as engaged—the jet that merged with Red was to fight to stay alive while forcing the adversary to maneuver away from the engaged fighter, creating sufficient range to allow a quick kill. This puts the nonengaged fighter at a disadvantage since she or he is not allowed to fight in the most tactically efficient way. Instead, the nonengaged fighter trusts that the engaged pilot will quickly kill the adversary. These differences are attributable to variations in cultures and experiences; Dutch tactics were as effective as US tactics, yet they developed in a different culture with a different mind-set. If NATO allies execute differently, one can imagine the innumerable variations among potential adversaries from non-European cultures.

19. After returning from an exercise with another country, one aggressor pilot made the very astute observation that cultural/societal attitudes in this country would call for executing defensive counterair tactics very differently than the USAF's practice. In the American construct, the closer the threat to the point defended (home base, major city), the higher the acceptable risk level, to the point that a pilot will engage at a disadvantage, risking being shot down. The value of the defended target is greater than that of the pilot or the aircraft. Because they occupied a relatively high place in the social strata, host-nation pilots were more apt to continue to retreat until they established a tactical advantage, even if it meant putting the defended object at risk. The pilot and aircraft were considered more valuable than the defended people/places.

20. Air Combat Command/A3J, telephone conversation with the author, September 2006. According to the Weapons School commandant, the budget for traveling adversary support was \$14 million in fiscal year 2007. ATG priorities for supporting Nellis training are Red Flag first,

and then the Weapons School, and then test. In 2007 the 64th and 65th AGRS supported all Red Flag adversary requirements and roughly 30 percent of Weapons School requirements.

21. With 48 PAAs at Nellis, the ATG will be able to fly approximately 9,400 sorties per year. The Weapons School requires 5,300 sorties, whereas Red Flag needs 1,140 (12 sorties per vulnerability period), 1,440 for 12 road shows, and 400 to support operational test and evaluation, totaling roughly 8,000. Sortie requirements for Eielson AFB remain to be determined.

22. The ET3 process demonstrates the utility of having small numbers of select representatives from each domain assemble to assess an emerging capability. Although the end product is not fully vetted, it is timely. ET3 reports have had remarkable impact on Air Force training in a very short period of time. This same "think tank" approach to ATG integration will provide lessons that will support Blue integration.

23. A red team is "an organizational element comprised of trained and educated members that provide an independent capability to fully explore alternatives in plans and operations in the context of the operational environment and from the perspective of adversaries and others." Joint Publication 1-02, *Department of Defense Dictionary of Military and Associated Terms*, 12 April 2001 (as amended through 30 May 2008), 460, http://www.dtic.mil/doctrine/jel/new_pubs/jp1_02.pdf.

24. *Assessment*: There have been attempts in the past to have the aggressors support operational readiness inspections as adversary air. Although this sounds like a perfect fit on the surface, it is important for the ATG to stay out of the assessment role. If units are concerned that their performance in Red Flags / road shows will go on a scorecard and be sent up the chain of command, they won't focus on learning. Instead they'll stack the deck with their best to make sure they pass the test. *Teaching Tactics*: Because members of the initial aggressor cadre were hand selected for their superior tactical skill, they were encouraged to teach basic fighter maneuvers and air combat tactics to the units they visited. Today, the program still gets the most qualified operators, but because they focus exclusively on the threat, their familiarity with Blue tactics falls away quickly. Blue knowledge forms the basis for their understanding of the adversary; maintaining independence from Blue demands that they present the most relevant adversary tactics and let Blue figure out how to deal with them. *Presenting a Threat That Doesn't Exist*: At first blush, many adversaries appear to be much more capable than they really are. In their desire to prepare for the worst case and to challenge Blue to be better, aggressors have sometimes found intel that supports difficult, if not unsolvable, tactical presentations. It takes a good deal of judgment to know when scenarios/tactics are nonrepresentative.

25. Lt Col Paul Huffman, "Aggressor Transformation: Beyond the Flightline" (thesis, Air War College, Maxwell AFB, AL, 2007), 38, <https://research.au.af.mil/papers/ay2007/awc/Huffman.pdf>. Project Red Baron analyzed the reasons for the Air Force's air-to-air losses in Vietnam.

Journals for Space Professionals

So Much to Read, So Little Time

LT COL DAVID C. ARNOLD, USAF, PHD*

SPACE WAS THE final frontier—later, the ultimate high ground. Today we squeeze space in between air and cyberspace in the Air Force's responsibility—a fact certainly reflected in *Air and Space Power Journal*. But two other journals provide space professionals with current and historical perspectives solely on that middle domain without becoming overly technical or focusing on the engineering or science of spaceflight. So, although it is always difficult to find time to read many of the recommended books on professional reading lists devoted to space, a 50- or 60-page journal is an easy read on a long temporary-duty flight.

First published in 2004, *High Frontier*, a quarterly publication from Headquarters Air Force Space Command, was really the brainchild of former Space Command leader Gen Lance W. Lord. Acting on a mandate from the Rumsfeld Space Commission, the command inaugurated a development program for space professionals that, among other things, has begun a certification plan for space professionals working in the space operations, missile operations, and acquisition fields. However, the "journal is designed to generate intellectual debate through thought provoking articles and essays on the strategic, operational and tactical aspects of space and missile power in the twenty-first century."¹ Themes have run from "Space and the Joint Fight" to "Space-Based Positioning, Navigation, and Timing" to the future of the intercontinental ballistic missile and strategic deterrence. Topics discussed have included development of space professionals, the total force and space, and

specific mission areas in space operations. *High Frontier* always features a senior-leader perspective and often one from industry leaders as well as war fighters other than Airmen. The journal considers the joint view important because it seeks to reach space professionals in the military—both Airmen and warriors from sister services. Most issues also include book reviews intended to spark commentary and foster intellectual discussions. Advised by some of the leading intellectuals in the space business, *High Frontier* offers readers a free subscription to its electronic version.

Making its appearance in 1992, the quarterly journal *Quest: The History of Spaceflight*

is packed with articles written by professional and amateur historians alongside interviews with key figures and visionaries. Each 64-page issue is enhanced with photos and charts that will entice the most casual reader.

Quest is [the only peer-reviewed journal devoted exclusively to space history and] the only publication solely dedicated to the history of spaceflight. It exists to capture stories related to the people, projects, and programs that have been part of the last fifty years of . . . civil, military, commercial, and international space activities.²

Every issue includes an oral-history interview, often taken from the National Aeronautics and Space Administration's (NASA) archives of conversations with former astronauts and engineers, and other interviews with key figures from the military or commercial sides of space. One issue featured an oral history with the first director of the weather satellite program as well as an article on the program's

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development inside the National Reconnaissance Office.³ Recently, *Quest* has offered themed issues as well, such as the one commemorating the 50th anniversary of the launch of Sputnik. That issue's feature article, by Roger D. Launius, former chief of the NASA history office and dean of space historians, received accolades from the Society for History in the Federal Government for its look at the way historians have interpreted the impact of Sputnik on American society. The Sputnik issue also included a look by well-known Soviet space-history expert Asif Siddiqi from the Soviet side of the launch. Another recent article showed all of the different design options for the Dyna-Soar X-20 program. James R. Hansen, Neil Armstrong's biogra-

pher (*First Man: The Life of Neil A. Armstrong* [Simon & Schuster, 2005]), contributed a piece on Armstrong's role in the *Challenger* accident-investigation board, a piece that Hansen had removed from the biography. Each issue offers several book reviews and lists of recent publications on space history. Although a not-for-profit publication, *Quest* does charge \$30 per year for a subscription.

So, while space professionals can continue to develop by reading *Air and Space Power Journal*, it certainly doesn't hurt to branch out a bit and explore some other perspectives from time to time. *High Frontier* and *Quest: The History of Spaceflight* are two good options for doing so. □

Notes

1. Gen Lance W. Lord, "Welcome to High Frontier!" *High Frontier* 1, no. 1 (Summer 2004): 3. <http://www.afspc.af.mil/shared/media/document/AFD-070622-055.pdf>.

2. "About Quest," <http://www.spacebusiness.com/quest> (accessed 19 May 2008).

3. See David C. Arnold, "An Interview with Thomas Haig," and Cargill Hall, "A History of the Military Polar Orbiting Meteorological Satellite Program," *Quest: The History of Spaceflight* 9, no. 2 (December 2001): 53-61.

We imperil our security, our people, and our way of life if we fail to maintain and sharpen America's edge—the Air Force—provided Global Vigilance, Global Reach, and Global Power advantages which underwrite the defense and sovereignty of our Nation.

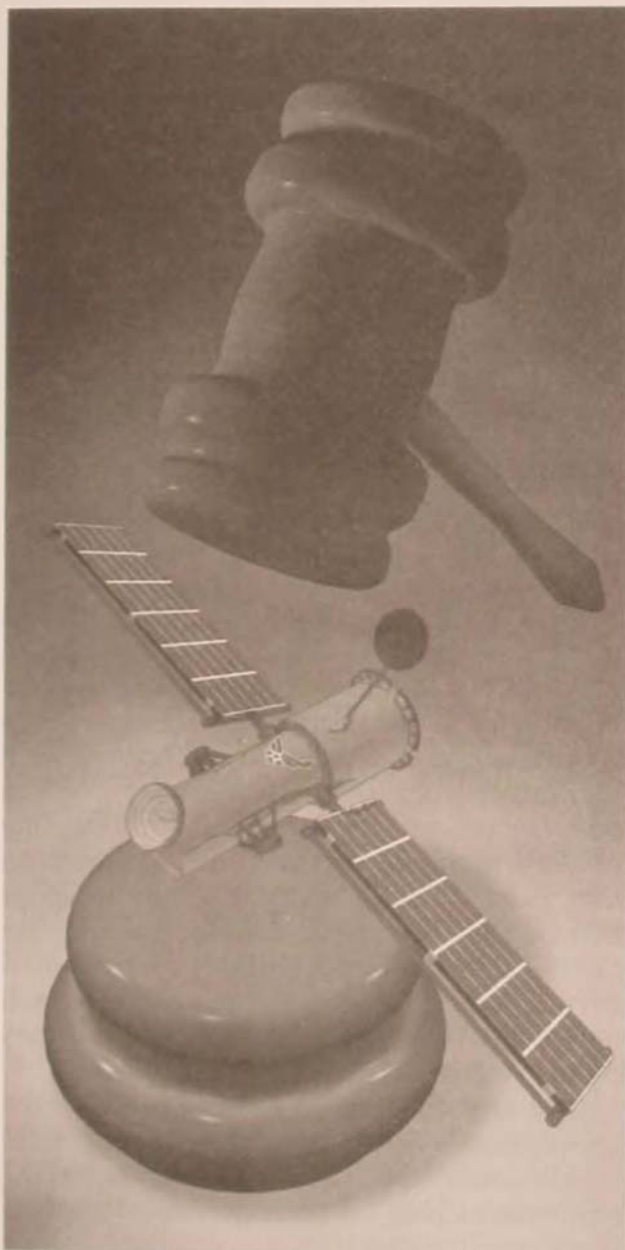
—Air Force Posture Statement 2008



Defense of US Space Assets

A Legal Perspective

CAPT ADAM E. FREY, USAF



Editorial Abstract: A recent antisatellite test by China—which that country can legitimately claim is legal, according to international treaty—highlights the danger posed to spaceborne US assets. To determine the most appropriate US response, the author delves into a legal assessment, using both United Nations treaty stipulations and principles of the Law of Armed Conflict, to choose the better of two future courses of action. In deciding between weaponizing space or reducing vulnerability, he concludes that the US should select the latter.

THE U.S. IS more dependent on space than any other nation. Yet the threat to the U.S. and its allies in and from space does not command the attention it merits.¹ This was the conclusion of a space commission headed by former secretary of defense Donald Rumsfeld, warning of a possible “space Pearl Harbor” incident that could exploit the vulnerabilities of US space assets. Gen Lance Lord, former commander of Air Force Space Command, similarly warned that a loss of space assets “not only cripples our land, air and sea forces but . . . would have catastrophic consequences to our entire economy.”² For example, the accidental loss of a single satellite in 1998 disrupted pag-ers, television, and radio broadcasts world-

wide.³ It takes little imagination to consider the resulting chaos if multiple satellites were destroyed simultaneously.

The possibility of a space Pearl Harbor is very real. On 11 January 2007, exactly six years after the Rumsfeld report, the People's Republic of China steered a missile into one of its own aging weather satellites, bringing this hypothetical danger one step closer to reality.⁴

China's test reignited the debate over whether and how the United States should prepare for space warfare. Because of its heavy commercial and military dependence on satellite technology, America has good reason to take notice of this test. The Air Force, one of the largest contributors to satellite operations, has a particular interest in learning how China accomplished this feat and, more importantly, how the United States can defend its satellites from similar attacks.

When developing satellite-defense strategies, one must consider a particularly important factor—the law. This article examines how relevant treaties and legal principles affect space warfare. First, it outlines the pertinent international space law, focusing on both United Nations (UN) treaties and conventions and the principles of the Law of Armed Conflict (LOAC), and then analyzes the legality of China's test under these bodies of law. Finally, it discusses the options available to the United States, explaining why the best legal and practical choice is to design better satellites and limit the extension of warfare into outer space.

Overview of Space Law

Any legal analysis of space activities must begin with the UN's Outer Space Treaty of 1967, which establishes the basic legal principles and prohibitions relevant to space.⁵ Its first two articles set the framework by declaring that nations have "freedom of scientific investigation in outer space" and that space and celestial objects (such as the moon) cannot be owned.⁶ The broad concept is that all nations will share space.

Articles 3 and 4 of the treaty significantly restrict military activity in space. Under Article

3, states must conduct their space activities "in the interest of maintaining international peace and security." Article 4 prohibits placing "nuclear weapons or any other kinds of weapons of mass destruction" into orbit or permanently affixing them to a celestial body. Furthermore, the moon and other celestial bodies may be used only for "peaceful purposes"; they cannot be equipped with military bases or be used for weapons testing. However, celestial bodies may be used for "scientific research" or "peaceful exploration."⁷

There are two noteworthy points here. First, the treaty explicitly places the "peaceful purposes" restriction only on the moon and other bodies. As written, Article 4 suggests that states may engage in nonpeaceful activity in outer space as long as it does not occur on a celestial body. Indeed, this is how the United States officially interprets this article.⁸ However, as a matter of policy, the United States conducts its space activities for peaceful purposes.⁹

Second, the phrase "peaceful purposes" is problematic since it is undefined. Some argue that the "peaceful purposes" clause applies by extension to outer space, meaning that any military use of space violates the treaty.¹⁰ However, the clause is generally interpreted to mean that states cannot use outer space for full-scale warfare, particularly nuclear war.¹¹ Military use of space in support of operations—such as communications, intelligence gathering, and precision targeting—is commonly considered peaceful if it does not violate other international law.¹² In other words, space operations are peaceful, provided they are not "aggressive."¹³ Space may still be used as a medium of warfare: the treaty does not prohibit antisatellite (ASAT) weapons or even nuclear weapons that merely transit space.¹⁴ Other weapons may be deployed in space so long as they are neither nuclear weapons nor weapons of mass destruction.¹⁵ Furthermore, self-defensive acts in space are also permissible, provided they do not violate other treaty restrictions.¹⁶

The Outer Space Treaty also provides the appropriate response if one state interferes with another's space activities. Articles 6 and 7 hold states liable for damage caused by their space activities and launches, whether such ac-

tivity is conducted "by governmental agencies or by non-governmental entities" within the state.¹⁷ Article 9 requires states to avoid the "harmful contamination" of outer space and celestial bodies. If a state believes that its activities could cause such harm, it must undertake "appropriate international consultations" before proceeding. Conversely, if a state believes it could be harmed by another's actions, it "may request consultation concerning the activity or experiment."¹⁸ Article 10 further allows states to request observation of each other's launches, and Article 12 requires any space facilities and equipment to be open for observation.¹⁹ However, the treaty provides no right of appeal if two states cannot resolve these issues themselves.

These sections of the treaty suffer criticism for shortcomings such as vague terms and lack of enforcement mechanisms.²⁰ However, the UN's Liability Convention addresses some of these problems by expanding when, how, and to what extent a nation is held accountable when its space activities injure another's interests.²¹

The convention's first article provides that states can be held liable for loss of life, personal injury, or property damage caused by their space operations. It also reinforces the Outer Space Treaty's provision that a state is liable for damage caused by nongovernmental entities launching under state license. It further provides that a state is liable for damage caused not only by an object but also by an object's "component parts."²² However, Article 3 qualifies the liability by noting that the launching state is liable only if those controlling the launch are at "fault."²³

The remainder of the convention presents procedures for an aggrieved state to make a claim for damage. Articles 9 through 15 provide that claims must be presented within one year through "diplomatic channels" or, if unavailable, through the UN secretary-general. If the states cannot settle matters, they may create a commission, with each state providing a representative and a mutually appointed chairman. Damages are determined under international law, with the goal of restoring the state to its preinjury condition.²⁴

Although it clarifies some of the Outer Space Treaty's ambiguity, the convention still faces criticism. First, its definition of an "object" as including "component parts" does not specify whether this includes debris, so a launching state might not be liable for debris-based damage.²⁵ Second, although the convention imposes a "fault" standard for damages, it does not define how much care should be exercised during a launch.²⁶ In other words, if two space objects collide, one state could argue that it took all reasonable precautions while the injured state could argue that it did not. Third, fault may be difficult to prove since specific pieces of debris can be difficult to identify and track, and the cause of a collision can prove equally elusive.²⁷ One scholar notes that the mere fact of a collision does not automatically put the state that created the debris at fault.²⁸ Finally, there is no established system for processing claims or for interpreting or enforcing the convention's terms.²⁹ The convention's litigation mechanisms have never been used, so their effectiveness remains unknown.³⁰

A final body of law for consideration—LOAC—governs how nations may wage war. LOAC sets limits on conflict-related issues, including when and to what degree force may be used; targeting; and treatment of non-combatants, civilians, and prisoners of war. Although several LOAC principles are inapplicable to satellites, others, such as targeting principles, are very relevant to their wartime application.

The first principle to consider, "military necessity," provides that a person or object should not be targeted unless doing so gives an attacker some real advantage.³¹ The United States formally acknowledged this principle when it signed the 1907 Hague Convention, which prohibits any action "to destroy or seize the enemy's property, unless such destruction or seizure be imperatively demanded by the necessities of war."³² The Nuremberg trials further explained that "destruction as an end in itself is a violation of international law. There must be some reasonable connection between the destruction of property and the overcoming of the enemy forces."³³

A second relevant LOAC principle, proportionality, holds that an attacker must balance the expected damage against the military advantage to be gained.³⁴ This principle is reflected in Additional Protocol I to the Geneva conventions, which prohibits "an attack which may be expected to cause incidental loss of civilian life, injury to civilians, damage to civilian objects, or a combination thereof, which would be excessive in relation to the concrete and direct military advantage anticipated."³⁵ Thus, an action causing excessive or catastrophic damage to civilians or property is illegal.

A final, relevant principle—discrimination—holds that attackers must distinguish between military and nonmilitary targets. Additional Protocol I limits targets "strictly to . . . those objects which by their nature, location, purpose or use make an effective contribution to military action and whose total or partial destruction, capture or neutralization, in the circumstances ruling at the time, offers a definite military advantage."³⁶ Examples of prohibited targets include civilians, civilian property, cultural places, food supplies, and drinking water.³⁷

Discrimination can be difficult to apply to "dual use" objects having both civilian and military functions, such as airports, buildings, and communications systems.³⁸ Although attacking such objects would hinder the enemy, civilians would also suffer. Moreover, since Additional Protocol I's test is subjective, commanders could reasonably disagree on whether attacking these objects truly "offers a definite military advantage."³⁹ Here, the principle of proportionality gives some guidance: since collateral damage to civilians is considered a natural consequence of combat, the proportionality test should determine if an attack on a dual-use object warrants the consequences to the innocent.⁴⁰

China's Test and Its Legal Ramifications

Satellites are vulnerable to several possible attacks from ASAT weapons.⁴¹ A nuclear detonation could generate an electromagnetic pulse, disabling the sensitive circuitry of un-

shielded satellites over a wide range.⁴² Space mines or other "proximity weapons" could explode within lethal range of a satellite.⁴³ A laser or energy-based weapon could damage a satellite's components, including circuitry, optics, or solar panels.⁴⁴ Or a "soft kill" could render a satellite inoperable—for example, by tipping it out of orbit, jamming its signals, or blinding it with lasers or paint.⁴⁵

China's recent ASAT test offers an example of another type of attack: the "kinetic energy weapon," which relies on force of impact rather than an explosion.⁴⁶ This weapon has the tremendous speed necessary to achieve orbit, traveling in the range of 17,500 miles per hour.⁴⁷ Even the smallest space objects can cause serious damage at such tremendous velocities.⁴⁸

China's "kill" occurred in an orbit over 800 kilometers (500 miles) above Earth's surface, dangerously close to the range of many US spy and missile-defense satellites as well as many civilian satellites.⁴⁹ Besides the test's proximity to US space interests, the major concern is the danger to satellites or other space objects from the test's debris. The explosion created a "hypersonic shockwave" that tore both missile and satellite into a high-speed debris cloud, composed of 300,000 pieces.⁵⁰ Scientists have labeled this contribution to orbital space debris "the worst ever," as it scattered fragments between orbits as low as 200 kilometers (124 miles) and as high as 3,800 (2,360 miles).⁵¹ Although some of the individual particles may fall back to Earth, others are expected to remain in orbit for "a very long time."⁵² Additionally, many of the particles are too small to track, making them effectively invisible to spacecraft and payloads.⁵³ Most satellites lack the protective shielding necessary to defend against such debris.⁵⁴

China claims that its test was both nonbelligerent and completely legal; on the latter point, that appears mostly correct.⁵⁵ That is, the test does not seem to have violated any of the aforementioned treaties or LOAC principles. First, the ASAT test evidently did not violate the Outer Space Treaty, which provides that all nations have an equal right of access to space for peaceful purposes. China could claim that it conducted the test for scientific

and defensive purposes, which would make it peaceful under the treaty's terms.

The only treaty section that China could have violated is Article 9, which prohibits the harmful contamination of space. However, whether the test amounted to a contamination is open to interpretation. Under the treaty, "harmful contamination" of space, though prohibited, is undefined. China could point out that because some of the debris will fall into the atmosphere and disintegrate, the incident was not "harmful" as envisioned by the convention. It might also note that space debris is not a new problem and that no other nation has yet been held responsible under international law for polluting outer space.⁵⁶

The Liability Convention may also be of little aid. Even if China's debris damages another state's assets in the future, China might simply argue that it was not at "fault" under the convention since it could not have reasonably predicted the amount of debris created by the collision.

Furthermore, the Liability Convention outlines a state's options in the event of disaster; it is a reactive rather than a proactive measure. Presently, the United States can only observe the debris cloud and prepare for damage to its space assets. If this occurs, the United States could invoke the convention but would still need to establish its damages, prove that the harm is traceable to China's test, demand payment, and hope that the collections process goes favorably. Since these litigation mechanisms have yet to be employed, their effectiveness remains unknown.⁵⁷

LOAC's targeting rules do not directly apply to China's test since that country targeted its *own* satellite. LOAC could only affect any future warfare application of the test. The principle of military necessity would permit China to target US military satellites in a US-China war. China would only need to show a benefit to its war effort, such as disrupting US communications, targeting, or battlespace awareness. Although the principle of discrimination prohibits China from targeting purely civilian satellites, dual-use satellites shared by the military and the civilian sector might also become legal targets under this first principle.

However, the principle of proportionality would require further restraint from China. An attack on satellites could be considered "catastrophic" for two reasons. First, attacking even a single satellite risks creating additional debris, further contaminating Earth's orbit. Each successive attack would put other satellites and spacecraft at increased risk, and these deadly debris particles would not distinguish among friend, foe, or neutral. Even China's own space operations could be disrupted if space became sufficiently polluted. Attacking any satellite, therefore, requires serious consideration of the collateral consequences.⁵⁸

Second, since the United States depends heavily on satellite technology and since the military and the civilian sector share many satellites, destroying certain satellites could drastically affect the civilian population. Attacking communications systems could impair banking and trade, disrupting the US economy. Likewise, the Federal Aviation Administration may upgrade the national air traffic controller systems to exclusive use of global positioning system satellites.⁵⁹ The unexpected loss of this network could result in numerous lost or crashed aircraft.

Although proportionality should restrain China from attacking US satellites under these circumstances, LOAC is largely self-regulatory, so states must ensure their own compliance with these rules. Therefore, China could interpret the rule unfavorably or disregard it altogether. Furthermore, LOAC analysis could come too late. That is, the realization that an attack violates the rule of proportionality might occur only after a catastrophe has taken place.

The Appropriate US Response

Because of space law's uncertainty, the only practical limitation on an attack against US space assets is a foreign power's own self-restraint. This may exist in one of two forms: fear of US retaliation with political and military power, or compliance under a moral or legal obligation to treaty law. However, as developing nations and terrorist groups gain access to space, the United States can no longer

assume that either form of self-restraint will protect its orbital assets. Instead, it must now take proactive defensive measures. Two questions remain. First, what options does the United States have? Second, how does the law restrict those options?

Space law provides only two diplomatic options that the United States could invoke to prevent future missile tests by China or another nation. The first is the Outer Space Treaty's provision allowing consultation if one state believes that another's activities could interfere with its space programs. The second is the provision allowing one state to observe and inspect another's space programs and facilities. Neither provision, however, enables a state actually to stop future tests. The treaty allows only a request for consultation or inspection, and the other nation is not obligated to grant it.

The United States, therefore, is left with two military options—"weaponization" and "hedging."⁶⁰ Weaponization is the process of placing permanent weapons systems in space in anticipation of an attack. Hedging, which focuses on vulnerability reduction, "minimize[s] any adverse consequences in the event of space warfare initiatives by other states, and . . . deter[s] other states from first crossing the critical thresholds of flight-testing and deployment."⁶¹ The Air Force is already considering both options, weighing whether to shield satellites individually (hedging) or to build a ballistic missile system to destroy missiles before they reach US satellites (arguably, a form of weaponization if extended into outer space).⁶²

Although arguments may exist for employing either option, space law appears to prefer hedging over weaponization. Recall that the United States is generally limited to using space for peaceful purposes. Although the Outer Space Treaty does not entirely preclude weaponization, it does restrict it—a fact illustrated by its prohibitions on placing nuclear weapons or weapons of mass destruction into orbit. Aggressive uses of space are generally disfavored, but defensive use of space is considered acceptable. Thus, the only permissible weaponization under either the treaty or US

policy might be systems exclusively designed to protect satellites.

The better argument against weaponization lies in the United States' obligation to protect the space environment, both legally (treaty requirements) and practically (the need to keep space safe and usable). Nations always have a right to self-defense (which cannot be surrendered, even by treaty), but the United States is still bound by the treaty's prohibition against contaminating space. Although a self-defensive act that pollutes space may be permissible, the testing of technology in anticipation of self-defense might not be. Therefore, the United States should remember its obligation to avoid creating debris when developing defensive space weapons.⁶³ "Soft-kill" weapons that disable an attacking weapon are clearly acceptable. Explosive weapons, such as space mines surrounding satellites, might not be if they create significant space debris.

Thus, it is evident that weaponization, in practice, may violate the duty to avoid the harmful contamination of space. Hedging, therefore, is the only remaining military alternative. The United States has multiple hedging options with which it could successfully defend its space assets. An examination of these options reveals that they do not risk violating any part of the relevant space law.

First, the United States could rely upon existing technology to prevent space-based weapons from leaving Earth's atmosphere. The primary goal would involve targeting the enemy's weapons before launch, with a secondary goal of targeting enemy space facilities to disable their launch capability.⁶⁴ An antiballistic missile (ABM) system could be used on missiles that are successfully launched, whether from space facilities or mobile platforms such as ships or aircraft. The United States recently tested the effectiveness of an ABM system when an F-16 fighter used an air-to-air missile to destroy a rocket in its boost phase.⁶⁵ Since the missile never reached orbit, there was no space debris.

Second, several possibilities for reducing satellite vulnerabilities present themselves. These include using antijamming measures; hardening the satellites to protect against

electromagnetic pulses, radiation, or explosions; adding maneuverability to actively avoid attacks; or including stealth features.⁶⁶ Making satellites more difficult to locate and disable also eliminates the problem of space debris. Moreover, as a passive methodology, hedging ensures that the United States' use of space remains peaceful. Admittedly, implementation of hedging mechanisms on currently orbiting satellites is problematic. However, the United States can reduce vulnerabilities by upgrading its newer replacement satellites. Although these features could make a payload more expensive, the benefit to the fragile satellite network would clearly outweigh the cost.

Third, the United States should prepare redundancies or backups to protect its satellite network in case of an attack. The results of losing a satellite in 1998, mentioned previously, suggest that a major attack on its space systems—or even one critical satellite—could shatter US interests. Options for compensating for the network's weaknesses include redundant satellites, ready-to-launch replacements, or secondary alternatives to satellite functions. Strategic planners also should plan for scenarios in which the benefits of satellite technology are suddenly unavailable to war fighters.

Finally, one option involves neither weaponization nor hedging. Specifically, the United States can influence other nations by using its other instruments of national power, including information, diplomacy, and economics. In brief, these instruments present nonmilitary alternatives for convincing foreign powers to use space peacefully. For example, the United States could use diplomatic power to engage in discussions with nations regarding their space programs. It could even use diplomacy to invoke the consultation and observation portions of the Outer Space Treaty. Although the effectiveness of those parts of the treaty remains uncertain, they still present a peaceful alternative to space warfare.

Conclusion

China's test raises two important points. First, the United States does not hold a mo-

nopoly on space operations. Other nations have been operating in space for decades, and developing nations such as China are now entering that realm. By signing the Outer Space Treaty, the United States acknowledged that all nations have the right to explore and operate in space. It is therefore obligated to respect other nations' space operations as long as they do not threaten its own.

Second, the test illustrates that Thomas Jefferson's statement that "the price of freedom is eternal vigilance" applies as readily to space as it does to Earth. US space assets are not immune from warfare by virtue of being in orbit. Rather, the United States should assume that its space systems could be attacked. Although many nations have signed the relevant space treaties, the United States should not naïvely assume full compliance. Nor should it expect nonstate actors, such as terrorists, to comply.

The applicable international treaties, conventions, and LOAC principles do not specifically explain what the United States should do in preparation for a real attack. Rather, they outline what it *cannot* do. The United States must use space for peaceful purposes, refrain from using space aggressively, take care not to pollute the space environment, and be prepared to make reparations if it damages another state's assets. In the event of war, states might be able to treat each other's satellites as legitimate targets but only after ensuring that the satellite's loss would not excessively harm civilians.

Although arming the heavens might seem the most tempting military response, the law clearly favors the defensive method of hedging. Admittedly, weaponization could be legal in some limited circumstances. However, hedging raises fewer concerns over violating international law and still provides viable solutions for protecting space assets. Whether hedging occurs via ABMs, more secure satellites, or some other method is a question best left to military strategists. Ultimately, following the law is vital for ensuring that outer space remains the peaceful environment envisioned by the treaties. By doing so, the United States will maintain not only the ultimate strategic high ground but also the moral one. □

Notes

1. Jean-Michel Stoullig, "Rumsfeld Commission Warns against 'Space Pearl Harbor,'" *Space Daily*, 11 January 2001, <http://www.spacedaily.com/news/bmdo-01b.html>.
2. Gen Lance W. Lord, "Why America Needs Space: The Prerequisites for Success," *High Frontier* 2, no. 1 ([Fall 2005]): 2, <http://www.afspc.af.mil/shared/media/document/AFD-060524005.pdf>.
3. "Wayward Satellite Wreaks Havoc," Reuters, 20 May 1998, <http://www.wired.com/science/discoveries/news/1998/05/12414>.
4. James Oberg, "Bold Move Escalates Space War Debate," *MSNBC.com*, 18 January 2007, <http://www.msnbc.msn.com/id/16694039>.
5. "Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies," in *United Nations Treaties and Principles on Outer Space* (New York: United Nations, 2002), 3-8, <http://www.unoosa.org/pdf/publications/STSPACE11E.pdf>. China joined the treaty by accession in 1983.
6. *Ibid.*, 4.
7. *Ibid.*
8. Maj Douglas S. Anderson, "A Military Look into Space: The Ultimate High Ground," *Army Lawyer*, no. 276 (November 1995): 25.
9. National Aeronautics and Space Act of 1958, *US Code*, vol. 42, sec. 2451 (2007): "The Congress hereby declares that it is the policy of the United States that activities in space should be devoted to peaceful purposes for the benefit of all mankind."
10. Richard A. Morgan, "Military Use of Commercial Communication Satellites: A New Look at the Outer Space Treaty and 'Peaceful Purposes,'" *Journal of Air Law and Commerce* 60 (1994): 318-19.
11. See Maj Christopher M. Petras, "Space Force Alpha: Military Use of the International Space Station and the Concept of 'Peaceful Purposes,'" *Air Force Law Review* 53 (2002): 157-61, for a fuller discussion of the limits of "peaceful purposes."
12. Maj Robert A. Ramey, "Armed Conflict on the Final Frontier: The Law of War in Space," *Air Force Law Review* 48 (2000): 79-82. US policy states that "peaceful purposes" include "defense and intelligence-related activities." US National Space Policy, Article 2, 6 October 2006, <http://www.fas.org/irp/offdocs/nspd/space.pdf>.
13. Ramey, "Armed Conflict," 79; Maj Elizabeth Waldrop, "Integration of Military and Civilian Space Assets: Legal and National Security Implications," *Air Force Law Review* 55 (2004): 222-24; and Petras, "Space Force Alpha," 171-72.
14. Ramey, "Armed Conflict," 83-84; and Col Carol Hattrup and Maj Elizabeth Waldrop, "Space Law: Past, Present, and Future," *High Frontier* 2, no. 1 (Fall 2004): 24.
15. Ramey, "Armed Conflict," 83-84.
16. Anderson, "Military Look into Space," 26.
17. "Treaty on Principles," 5. Under Article 6, nongovernmental entities conduct space activities only under the authorization and supervision of the state from where the activity is conducted. *Ibid.*
18. *Ibid.*, 6.
19. *Ibid.*, 6, 7.
20. Robert C. Bird, "Procedural Challenges to Environmental Regulation of Space Debris," *American Business Law Journal* 40 (2003): 655-56; and Peter T. Limperis, "Orbital Debris and the Spacefaring Nations: International Law Methods for Prevention and Reduction of Debris, and Liability Regimes for Damage Caused by Debris," *Arizona Journal of International and Contemporary Law* 15 (1998): 330.
21. "Convention on International Liability for Damage Caused by Space Objects," in *United Nations Treaties and Principles on Outer Space*, 13-21. China joined the convention by accession in 1988.
22. *Ibid.*, 13.
23. *Ibid.*, 14. However, under Article 2, if an object causes damage while "on the surface of the Earth or to aircraft in flight," liability is absolute, with no consideration to whether the launching state was at fault. *Ibid.*, 13.
24. *Ibid.*, 16-17.
25. Limperis, "Orbital Debris," 330-33; and Christopher D. Williams, "Space: The Cluttered Frontier," *Journal of Air Law and Commerce* 60 (1995): 1147-48.
26. Limperis, "Orbital Debris," 330-31.
27. Jennifer M. Seymour, "Containing the Cosmic Crisis: A Proposal for Curbing the Perils of Space Debris," *Georgetown International Environmental Law Review* 10 (1998): 900; and Williams, "Cluttered Frontier," 1158-59.
28. Williams, "Cluttered Frontier," 1159.
29. Marc S. Firestone, "Problems in the Resolution of Disputes Concerning Damage Caused in Outer Space," *Tulane Law Review* 59 (1985): 763-64.
30. Ramey, "Armed Conflict," 91. Canada invoked the convention in the "Cosmos 954" incident in 1978, when a crippled Soviet satellite fell into its Northwest Territories. However, the incident was settled without resorting to litigation. See "Across Canada: Ottawa Signs Cosmos Pact on Crash," *Globe and Mail*, 3 April 1981.
31. The principle has four subelements: the user of force must be capable of regulating it; force must be necessary to achieve, as quickly as possible, the enemy's partial or complete submission; it must be no greater in effect on the enemy's personnel or property than needed to achieve victory; and it must not otherwise be illegal. Ensign Florencio J. Yuzon, "Deliberate Environmental Modification through the Use of Chemical and Biological Weapons: 'Greening' the International Laws of Armed Conflict to Establish an Environmentally Protective Regime," *American University Journal of International Law and Policy* 11 (1996): 812.
32. "Convention (IV) Respecting the Laws and Customs of War on Land and Its Annex: Regulations Concerning the Laws and Customs of War on Land, the Hague, 18 October 1907," Article 23(g), International Committee of the Red Cross (ICRC) International Humanitarian Law Database, <http://www.icrc.org/ihl.nsf/385ec082b509e76c41256739003e636d/1d1726425f6955aec125641e0038bfd6>.

33. *United States v. List*, in *Trials of War Criminals before the Nuremberg Military Tribunals under Control Council Law No. 10*, vol. 11 (Washington, DC: Government Printing Office, 1950), 1253-54, http://www.loc.gov/rr/frd/Military_Law/pdf/NT_war-criminals_Vol-XI.pdf.

34. Ramey, "Armed Conflict," 39. The proportionality test is the United States' preferred method of determining whether a target is a permissible one. The United States has declined to sign certain treaties, or portions thereof, that prohibit certain targets without any balancing test.

35. "Protocol Additional to the Geneva Conventions of 12 August 1949, and Relating to the Protection of Victims of International Armed Conflicts (Protocol I), 8 June 1977," Article 51(5)(b), ICRC International Humanitarian Law Database, <http://www.icrc.org/ihl.nsf/FULL/470>. A common example of this principle is the act of destroying a dam, which both disrupts an enemy's power supply and simultaneously kills a large civilian population. For this reason, Article 56 of Additional Protocol I specifically prohibits attacking dams and other installations containing "dangerous forces." The United States has not ratified Additional Protocol I but does interpret it as a restatement of customary international law. (See ICRC International Humanitarian Law Database, <http://www.icrc.org/ihl.nsf/WebSign?ReadForm&id=470&ps=S>.) I discuss it here for illustrative purposes.

36. "Protocol Additional to the Geneva Conventions," Article 52(2).

37. *Ibid.*, Articles 51-54.

38. J. Ricou Heaton, "Civilians at War: Reexamining the Status of Civilians Accompanying the Armed Forces," *Air Force Law Review* 57 (2005): 182.

39. *Ibid.*

40. *Ibid.*, 182-83.

41. Satellite systems are also indirectly vulnerable in two other aspects: at their ground-based control installations and in their data links via jamming. Michael Krepon with Christopher Clary, *Space Assurance or Space Dominance? The Case against Weaponizing Space* (Washington, DC: Henry L. Stimson Center, 2003), 68, <http://www.stimson.org/space/pdf/spacebook.pdf>. International space law likely would not apply to attacks on these aspects, so I will not analyze them further in legal terms.

42. Maj Earl D. Matthews, "U.S. Space Systems: A Critical Strength and Vulnerability," student paper (Newport, RI: Naval War College, 1996), 12, <http://handle.dtic.mil/100.2/ADA307419>; and Ramey, "Armed Conflict," 19-21.

43. Ramey, "Armed Conflict," 19-21; Krepon and Clary, *Space Assurance*, 64-65.

44. Krepon and Clary, *Space Assurance*, 65; and Ramey, "Armed Conflict," 23-26.

45. Ramey, "Armed Conflict," 27.

46. Daniel Engber, "How to Blow Up a Satellite," *Slate*, 19 January 2007, <http://www.slate.com/id/2157855>; and Ramey, "Armed Conflict," 22-23.

47. "General Urges Protection of Space Assets against ASATs," *Space and Missile Defense Report* 8, no. 44 (3 December 2007).

48. Ramey, "Armed Conflict," 22.

49. "US Condemns China Satellite-Killer Test," *Agence France Presse*, 18 January 2007; Marc Kaufman and Dafna Linzer, "China Criticized for Anti-Satellite Missile Test," *Washington Post*, 19 January 2007, <http://www.washingtonpost.com/wp-dyn/content/article/2007/01/18/AR2007011801029.html>; and "Scientists Decry China Satellite-Killer," United Press International, 19 January 2007, http://www.upi.com/Security_Terrorism/Analysis/2007/01/18/scientists_decry_china_satellitekiller.

50. Oberg, "Bold Move"; and Kaufman and Linzer, "China Criticized."

51. Frank Moring Jr., "China Asat Test Called Worst Single Debris Event Ever," *Aviation Week*, 11 February 2007, http://www.aviationweek.com/aw/generic/story_generic.jsp?channel=awst&id=news/aw021207p2.xml.

52. *Ibid.*

53. Ned Potter, "China's Space-Weapon Test Could Endanger Astronauts and Satellites," *ABCNews.com*, 1 February 2007, <http://abcnews.go.com/Technology/print?id=2841745>.

54. "China Anti-Satellite Test Sparks Space Junk Outcry," *Breitbart.com*, 19 January 2007, http://www.breitbart.com/article.php?id=070119103900.6anervk3&show_article=1.

55. Associated Press, "China Denies Intent to Militarize Space," *Breitbart.com*, 22 January 2007, http://www.breitbart.com/article.php?id=D8MQH1IG0&show_article=1; and "China Calls for Early Treaty to Ban Arms Race in Outer Space," *Malaysia General News*, 16 March 2007.

56. The United States is rated the highest contributor to the space-debris problem. Erin McCarthy, "Litter Kings," *Popular Mechanics* 181, no. 7 (July 2007): 81.

57. Ramey, "Armed Conflict," 91. See also note 30 above. The "Cosmos 954" incident was settled without any formal trial between the countries. Christopher C. Joyner, *International Law in the 21st Century: Rules for Global Governance* (Lanham, MD: Rowman & Littlefield, 2005), 244.

58. Maj David L. Wilson, "An Army View of Neutrality in Space: Legal Options for Space Negotiation," *Air Force Law Review* 50 (2001): 210-11.

59. "'NextGen' Air-Traffic Control Would Mean Safer Skies," *News Tribune* [Tacoma, WA], 18 May 2007.

60. Krepon and Clary, *Space Assurance*, 58-86.

61. *Ibid.*, 58-59.

62. "Air Force Mulls How to Defend Space Assets, Wynne Says," *Space and Missile Defense Report* 8, no. 12 (26 March 2007).

63. Some might question whether the United States violated these standards when it shot down one of its own spy satellites on 21 February 2008. The satellite became inoperable after launch and risked crashing into a populated area, exposing humans to its toxic fuel supply. However, the US strike differs from China's in that it poses a lower risk from space debris. The US strike occurred 130 miles above Earth's surface, unlike China's, which occurred much higher. Although debris from the Chinese strike still remains in orbit, much of the debris from the US strike was expected to fall back to Earth within 48 hours, and the rest within 40 days. "Navy Says Missile Smashed Wayward Satellite," *MSNBC.com*, 21 February 2008, <http://www.msnbc.msn.com/id/23265613>.

64. China currently has three launch facilities at Xichang, Tiayuan, and Jiuquan, with a fourth under development at Wenchang. William Atkins, "China to Add 4th Launch Site: Wenchang Satellite Launch Center," *iTWire.com*, 24 September 2007. <http://www.itwire.com/content/view/14574/1066>.

65. Bettina Haymann Chavanne, "First NCADE [Network Centric Airborne Defense Element] Missile Intercept Test Successful," *Aerospace Daily and Defense Report*, 6 December 2007.

66. Krepon and Clary, *Space Assurance*, 68-71.



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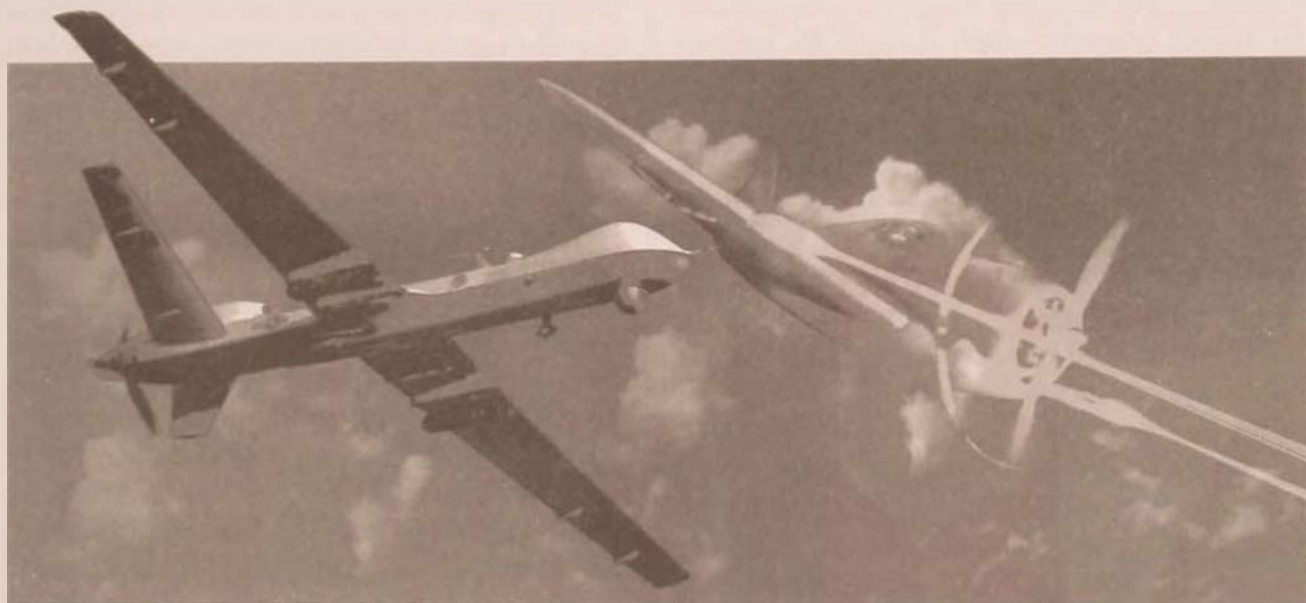
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Shifting the Air Force's Support Ideology to Exploit Combined Arms in the Close Fight

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Editorial Abstract: Today's war on terror requires the Air Force to employ all of its varied weapons effects for engaging in this fight. To do so, the author suggests that the service must make the support of US ground forces its tactical thrust by ensuring availability of the effects of combined arms. He proposes that the Air Force can realize that goal by fielding mission-specialized equipment, using the appropriate aerial platform, properly organizing core units, and integrating training.



THE NORMANDY INVASION lost momentum in June 1944 as Allied troops encountered hedgerow country. Here, German soldiers made each hedgerow a fortified line, every encircled pasture a killing field. With machine-gun pits in each corner, entrenched riflemen armed with *Panzerfaust* antitank weapons and pre-sighted artillery waited for Allied troops to make the mistake of a haphazard advance.

Those troops had arrived with no training on how to assault these barriers successfully

but quickly learned that a combined-arms approach was the answer. Attack teams capitalized on the inherent strengths of coordinated and varied weapons effects. First, engineers blew a hole in the hedgerow, allowing a Sherman tank to poke through and put a white-phosphorus round into the corners of the opposite hedgerow, engulfing German machine-gun pits in the burning chemical. While a slowly advancing tank covered the top of the hedgerow with .50-caliber machine-gun fire, the mortar team worked the area behind the berm to neutral-

ize the entrenched enemy. Infantry advanced behind the tank and, after reaching the far side, used grenades and rifle fire to destroy the remaining Germans.¹ Even an entrenched, skilled, and dedicated enemy had no means to resist a determined advance that used the multiple weapons effects intrinsic to combined arms.

Later, forward artillery observers (and, eventually, tank crews) were linked via radio with P-47 fighter-bombers and Piper Cub aircraft, providing additional options to front-line troops in need of support. Not only were the heavy machine guns and rockets of the P-47s at their disposal, but also the Piper Cubs could spot for long-range artillery or, when needed, relay requests to higher headquarters.² These tactics, born of necessity and engendered on the battlefield, fueled the Normandy breakout. For the first time, US ground and air forces communicated directly to achieve real-time battlefield effects through close air support (CAS).

On many levels, today's global war on terror (GWOT) differs from the US experience in World War II. There are, however, parallels that lead to lessons of value for today's conflict. In this article, I posit that the US Air Force should accept as its main tactical mission the provision of varied weapons effects associated with classic combined arms on all US battlefields. Additionally, I point out current barriers to assembling combined arms, gaps in current CAS capabilities, and a possible solution.

Roots of Success with Combined Arms

What is the root cause of the synergistic effects of combined arms? Clearly, an enemy can devise a defense or counter any one threat relatively quickly. If rifle fire is the predominant danger, he can dig a trench; if the other side releases gas, he can wear a mask; if attacked by massed and unescorted bombers, he can employ fighters—and so forth. For the defense, multiple methods of attack and varied weapons effects cause defensive integrity to fail.

Not entirely obvious is the fact that varied weapons effects are more important than multiple methods of attack. A single, survivable platform that can continue to deliver a variety of weapons, despite environmental conditions, will generate the synergistic effects of combined arms. The individual effects of classic combined arms (armor, artillery, mortar fire, etc.) do not derive from their being generated individually from different platforms; rather, they result from each munition's having its own strength. Essentially, we must match each target with ordnance that meets the challenges of the situation. For example, we could destroy an enemy bunker impervious to 105 millimeter (mm) cannon fire with a penetrating bomb; we could use a string of general-purpose rather than precision bombs against a dispersed enemy; and we could direct precise cannon fire instead of a bomb at an enemy in close contact with friendly troops.

If, however, no single platform has all the engagement options required or if environmental conditions or enemy defenses prevent its use, then we may need multiple platforms (usually a combination of ground and air assets) to produce the desired effects. For example if poor target weather or asset availability dictates selection of a B-52 against a dispersed enemy, we may use it to conduct semiprecise strikes with Joint Direct Attack Munitions (JDAM) or to cover an area with multiple unguided bombs. However, we may need armor's direct cannon fire to support closely engaged ground forces. The effective use of combined arms is not a function of utilizing multiple delivery platforms but of appropriately and smartly matching weapons effects and targets in time and scale to overwhelm defensive efforts.

Clearly, the combined-arms effects available to US ground-air teams can be decisive. But are they always available on today's battlefield? How will the US military ensure that its engaged troops always have the synergistic firepower effects of combined arms on hand? Before answering these questions, let's consider an example.

March 2002, Afghanistan

In early 2002, the United States launched Operation Anaconda against Taliban and al-Qaeda forces in the Shah-e-Kot Valley in southeastern Afghanistan—an isolated area, rugged and difficult to reach. Coalition forces had no access to artillery or armor—only small arms, mortars, eight AH-64 helicopters, and fixed-wing CAS aircraft.³ The plan called for indigenous forces, augmented by embedded special operations forces and ground forward air controllers (GFAC), to attack and push enemy forces through mountain passes where US forces pre-positioned by helicopter insertion would kill or capture them.⁴

The helicopter insertion of infantry came under immediate fire from an entrenched enemy's small arms, mortars, and rocket-propelled grenades.⁵ It quickly became clear that the enemy forces did not plan to flee as expected and that there were many more of them than just the several hundred irregulars originally estimated.⁶ Later calculations placed their numbers between 500 and 1,000.⁷

Errors made in estimating enemy numbers and their intent (to stay and fight), as well as the lack of supporting armor and artillery, led to heavier reliance on CAS than the coalition had planned.⁸ In the first 24 hours of the battle, F-15Es, F-16s, F/A-18s, and an AC-130 executed 177 attacks, strafing and dropping JDAMs as well as laser-guided bombs (LGB) in an area only about five and a half miles long by three miles wide.⁹ Airborne assets again made up for the lack of ground-based combined-arms elements.

Our use of 37 enlisted terminal attack controllers to observe the same valley and many of the same targets, combined with a lack of forward air controllers (airborne) (FAC[A]), amounted to poor employment of assets. In some cases, redundant attacks were called in on the same objective. More importantly, because of the lack of control, the extreme urgency of the situation, and redundant CAS requests, we did not always select the most survivable aircraft and most effective munitions for the job. As a result, all but two AH-64s suffered significant combat damage, making

them unavailable for duty on the second day of the battle.¹⁰

Initially planned as a quick operation for trapping the enemy, Anaconda devolved into a patchwork of friendly troops fighting defensive battles where "small-arms and mortar fire and effective and timely CAS . . . ensured that none of the small, isolated forces were overrun."¹¹ The effects of airborne-supplied combined arms proved pivotal, but we must wonder about the effectiveness had poor weather developed after the helicopter insertion or had an enemy well supplied with advanced surface-to-air missiles been present. We may not be so lucky in the future.

A Change in Mind-Set

Clearly, at certain times US operations, whether planned or unplanned, require the massed and varied weapons effects of the combined-arms concept. But are combined arms always available on today's battlefield? Recent examples suggest they are not. In the battle of An Najaf in Iraq (28–29 January 2007), artillery never became available, and Stryker armor didn't arrive until several hours after the battle had begun.¹² The situation in Anaconda proved even direr: we had no armor or artillery at all.

Why were those assets not available? Surely, a variety of reasons present themselves, ranging from incorrect intelligence (and the consequent flawed planning) to political requirements. However, geography also plays a role. Today's battlefields encompass large geographic areas (at times, much of Iraq) without obvious areas of enemy concentration, a situation that precludes stationing artillery and armor units near every potential battlefield. Second, as in the case of Anaconda, battlegrounds can be so isolated, either by terrain or distance, that we can't transport artillery and armor to the scene without a large-scale logistical undertaking, which may not prove feasible, depending on the tactical situation. These examples support the following propositions:

1. Varied weapons effects inherent in combined arms are potent, and their use in the CAS role can prove decisive.
2. US troops garrison large geographic areas that preclude positioning the traditional elements of combined arms at each potential point of need.
3. The United States can expect to fight in isolated areas that may preclude the use of armor, artillery, and large-scale reinforcements.
4. At times, US forces will fight with imperfect intelligence. Poor knowledge of enemy numbers, armament, and intent will prevent preplanned use of traditional combined arms.
5. The range, speed, and access inherent to airpower can make the multiple weapons effects associated with combined arms available to our troops over large or isolated geographic areas.

The nature of the GWOT ensures that our troops will engage the enemy nearly anywhere, anytime, in a variety of tactical situations. In this war, since the tactical thrust of the Air Force is to support our ground forces, it must embrace this understanding and position itself to maximize support. I do not mean to say that other Air Force roles have simply faded away—only that their importance diminishes in light of new challenges.

I suggest that the Air Force can optimally contribute to this war by assuring that the effects of classic combined arms remain available to our ground forces at all times and all places. In short, we must be capable of delivering scalable destructive power with a variety of kill mechanisms where our ground forces need them and when they need them—all the while surviving possible battlefield threats. The Air Force must be able to employ weapons close to or far from our troops, day or night and in poor weather.

Because of a lack of focus or failure to recognize the importance of this requirement, the Air Force has not developed such a capability. The current inventory of dedicated

close-support (i.e., both CAS and FAC[A] roles) assets consists of eight AC-130Hs, 17 AC-130Us, and a planned strength of 356 A-10s.¹³ Though formidable weapon systems in their own right, neither the AC-130 nor the A-10 can deliver the envisioned close-support capability.

For the AC-130U, high-resolution sensors (such as the all light level television and the infrared detection set) and a sophisticated fire-control system enable this aircraft to target its side-firing 25 mm, 40 mm, and 105 mm guns with remarkable accuracy. A strike radar even allows for all-weather and night-target acquisition and strike capability. Although the AC-130H lacks the strike radar (and associated all-weather capability), it retains much of the AC-130U's strengths.¹⁴ However, that gunship can't deliver the variety of cluster bomb units or low- and high-yield general-purpose and penetrating munitions available in JDAM and LGB packages. Nor is it reasonable to expect any AC-130 model to operate in or near surface-to-air-missile or guided anti-aircraft artillery (AAA) threat zones. Indeed, the ubiquity of shoulder-launched missiles and truck-mounted/-pulled AAA underscores the significant risks to any daylight AC-130 operation. Certainly, the aircraft has defensive countermeasures, but systems as simple as optically guided AAA will plague a platform that requires a predictable left-hand orbit to employ its weapons.

When the A-10 became operational in 1976, it represented a significant step forward in its niche, but today's modernization programs, despite adding capability, are not the leap forward commensurate with our current need.¹⁵ Upon completion of the A-10C modernization program, the aircraft will have the ability to drop precision LGBs, near-precision JDAMs, and strings of bombs or cluster bomb units. Also, its versatile 30 mm cannon can employ armor-piercing and high-explosive incendiary rounds. These varied weapons effects hint at the ideal combined-arms platform envisioned in this article.

Nevertheless, even though the A-10 is more robust than its gunship brethren, it is still vulnerable. Its ability to fly at low and medium

altitudes and to maneuver aggressively mitigates many threats. However, the jet's poor thrust performance makes it vulnerable when climbing back to the safer medium-altitude environment after a diving weapon delivery. All A-10s downed in Operation Desert Storm were hit by shoulder-launched missiles after delivering ordnance and climbing back to medium altitude.¹⁶ No doubt the proliferation of increasingly sophisticated anti-aircraft systems will further challenge this nearly 30-year-old aircraft.

These and other airframes offer pieces to the puzzle of the envisioned close-support platform, but none offer an entire solution. Nor does the intersection of various aircraft abilities. A B-52 may be able to fly high enough to avoid some threats, but it is restricted to providing only near-precision JDAMs or strings of general-purpose bombs. F-16s or F-15Es may be able to fill the gap by strafing for troops in close contact with the enemy, but the pilots still need to see the target to hit it with the precision required to avoid injuring friendly troops. This is one of many examples of current gaps in our close-support capability.

The Key West Agreement of 1948 clearly assigns the Air Force responsibility for providing CAS. However, "the Air Force's preoccupation with strategic bombers, missiles, and air superiority has led to lapses in other areas of its responsibility. Close air support had to be learned and relearned in World War II, Korea, and Viet Nam."¹⁷ A lack of emphasis on close support has led to this patchwork of capabilities, spread over various aircraft and

cobbled together in an attempt to fulfill an Air Force responsibility.

The traditional mind-set with regard to Air Force missions is that air superiority enables all other missions. Without air superiority, other roles (e.g., interdiction, suppression of enemy air defenses [SEAD], or CAS) become difficult, if not impossible, to execute. Hence, the Air Force has emphasized the development and fielding of specialized air superiority fighters, most recently the F-15A, F-15C, and F-22A. The Air Force developed this group of aircraft and trained its pilots to do one thing: destroy enemy aircraft in aerial combat.

All of the Air Force's other fighter-based roles were levied on the other group of fighter aircraft. Although capable of using air-to-air weaponry, these platforms were expected to execute the other Air Force roles, such as interdiction, offensive counterair (OCA), SEAD, nuclear strike, FAC(A), and CAS. Aircraft in this second grouping often performed multiple roles. For example, the F-16C is, or was at one time, expected to perform all of the above functions.

The required training, however, is role specific, each role requiring a separate skill set created through an upgrade program and developed with experience. Pilots also need proficiency flying to preserve these skills, but maintaining a high level of proficiency in all roles is unlikely (fig. 1).

Resources followed the perceived importance of roles. For example, consider the archetypical air-to-air fighter and an attack aircraft from opposite ends of the spectrum. The selective acquisition report of 31 December

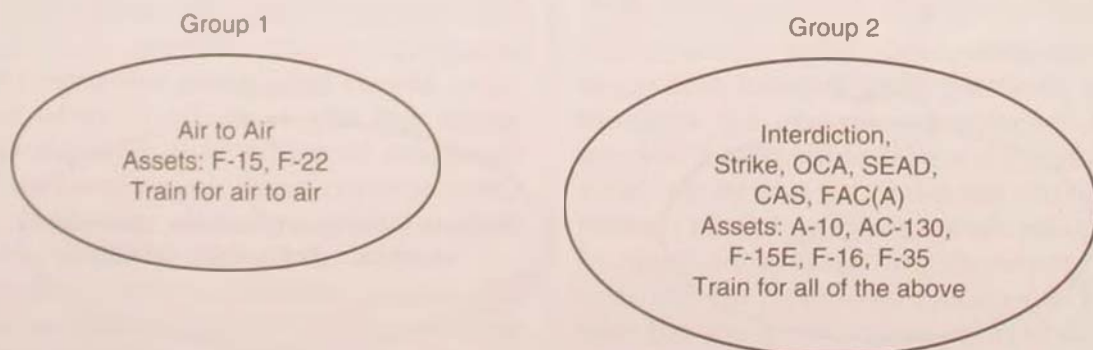


Figure 1. Current mind-set

2006 listed the cost of the F-22A program (almost exclusively air-to-air) at \$65.2 billion, equating to approximately \$353 million for each of a projected 184 aircraft.¹⁸ The A-10C program (almost exclusively CAS/FAC[A]) costs \$420 million.¹⁹ If the F-22 airframe were a unit of currency, the entire A-10C program would cost the same as about 1.2 F-22s. But that doesn't tell the whole story. The A-10C isn't a new aircraft. The production line was not restarted, new airframes were not built, and new engines were not fitted. This version amounts to an A-10A with a glass cockpit, carrying upgraded weapon systems to allow JDAM use and employing enhanced sensor integration.

The capabilities of new aircraft, such as the F-22, often leap beyond existing capabilities that fill the same role. Creating an entirely new platform ensures incorporation of improvements to the strengths of other aircraft but also enables the addition of new technology. The F-22 program has combined improvements and new technology synergistically to create unsurpassed mission capability.

Modernizing older aircraft, though essential to force sustainment, does not achieve comparable success. It can add capabilities such as JDAMs, utilization of the global positioning system, AIM-120 missiles, new radars, and so forth, but does not incorporate a set of new abilities into an optimized package that ensures an entirely new level of performance. For example, the packaging of LGBs and improvement of stealth technologies, both first used extensively in the Vietnam conflict, resulted in the F-117, which fundamentally shifted US power projection. Modernizing, however, often simply brings current plat-

forms up to the current standard or fixes aging problems to enable the platform to reach its phaseout date. To fix the structural problems that will allow 356 A-10Cs to make their projected phaseout in 2028, we must spend \$4.4 billion, or 12.5 F-22s.²⁰ My point is not that we need fewer F-22s or more A-10s; rather, I wish to show the difference in asset allocation for aircraft in the two different groups at opposite ends of the spectrum. This clearly demonstrates the Air Force's priorities and views on the relative values of roles.

I suggest a change to the Air Force's mindset. We should stop viewing air-to-air assets as the priority and focusing their capabilities on a single role while allowing other "nonspecialized" aircraft to handle all other fighter-based tactical roles. Instead, we should reverse the situation by elevating the CAS and FAC(A) (close-support) roles to paramount importance (fig. 2)

Critics may point out that the F-22 is capable of employing the 1,000-pound-class JDAM and is currently integrating the Small Diameter Bomb, and that this already represents a movement in the direction I suggest. But that falls short of my point. The F-22 significantly advances aerial combat: the combination of speed, stealth, sensors, data handling, and advanced air-to-air weapons will ensure that air-to-air combat reaches a new level of sophistication. By revamping older CAS systems, we cannot achieve anything on this order in the CAS world. And if we are willing to invest heavily in a capability that might possibly be used in the next decade, shouldn't we devote the same resources to a capability that will surely be used? These same critics and others

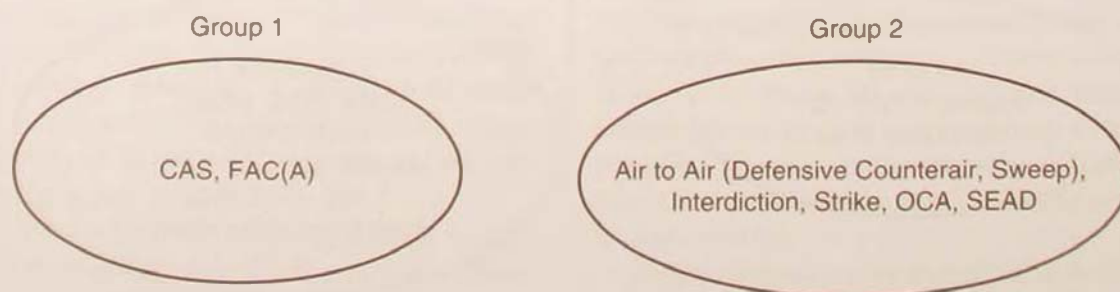


Figure 2. Required mind-set

may point to developing Chinese, Indian, and Russian airpower, arguing that the Air Force must have specialized aircraft—without “a pound for air-to-ground”—not only for power projection but also for protection of the aircraft providing close support. A need for such a capability exists but should not become the focus.

Furthermore, when considering such an argument, we should address an important development that has slowly built momentum over the last decade and that has far-ranging implications. Increasingly, fighter aircraft are becoming networked via data links such as the North Atlantic Treaty Organization's standard Link 16.²¹ Formerly, we designed and built air-to-air fighters around their radars. Generally, longer detection ranges equate to earlier weapons employment against enemy aircraft, but in a networked battlespace, the sensor does not have to be on the fighter employing the ordnance. Essentially, all properly networked aircraft have the same detection capability. The F-22's greater speed may allow farther missile ranges, but it seems more efficient to develop a longer-range missile for all fighters than to acquire a weapon system as expensive as a specially designed air-to-air platform.

The long-term fix to providing US ground forces access to the benefits of multiple and varied weapons effects inherent in combined arms starts with a mental shift. It's clear that the GWOT defines our enemies, who operate as covert irregulars far from traditional power bases. Because of their ability to hide within or just outside the societies they infest, we need ground forces to conduct offensive operations to defeat them. In light of these facts, the Air Force should embrace the idea that its primary tactical job is to provide lethal close support. The best support ensures survivable, scalable destructive power that should come in varied weapons effects to give our troops access to the synergistic effects of combined arms. Our service's priorities, concept development, and asset allocation must evolve to reflect this shift.

It's unlikely, however, that the Air Force will begin an acquisition program for a dedicated CAS/FAC(A) platform that meets the above requirements. Current efforts include acquir-

ing new tankers, continuing to build and field the F-22, as well as refurbishing and buying more cargo aircraft. We simply have no budget left to create this pivotal platform. In the absence of a shift in thinking that comes to regard a dedicated CAS/FAC(A) platform as the preeminent Air Force contribution to the GWOT, we will not develop such an asset.

But budget constraints should not stop the proposed shift. The Air Force's decision that the F-35 will replace the F-16 and A-10 is now beyond recall, so we should embrace it.²² A traditional Group Two aircraft, the F-35 is nonspecialized, and we envision that it will perform the same host of duties currently executed by the F-16 and A-10. But this should not stop the shift toward giving CAS/FAC(A) higher priority than other roles. The question becomes how to best use this nonspecialized aircraft to enhance close support of ground forces. We must take the following steps to ensure that the F-35 is best used in this role, and the sooner we take them, the more successful and seamless the transition.

The first step involves mission-specialized equipment. By dedicating onboard F-35 equipment to the close-support role, we ensure the availability of combined-arms effects to ground forces. For the Allied forces, the first link in improving the use of combined arms in Normandy was the establishment of communications among the artillery observers, tanks, and roving P-47s. We too must concentrate on communications—for the F-35. Thus, during its development, we should emphasize integration of secure, jam-resistant communications to effectively connect the pilot with a host of agencies.

Initially, we must ensure effective communication between the pilot and GFAC. The ability to talk, pass images, send and receive target data, locate friendly positions, and communicate the ground commander's intent is key. Voice communication is not sufficient; instead, we need a ground-to-air data link that passes a host of pertinent information, layered by mission and intuitively displayed. This implies not only potential changes to F-35 software but also a concurrent effort to develop an automated GFAC tool to guarantee seamless interaction between ground and air forces. This

tool must be able to provide high-resolution target data in the appropriate coordinate reference for weapons guided by the global positioning system; display GFAC and friendly locations, preferably on a terrain-representative map; show target imagery if appropriate; and provide laser illumination for LGBs. The device should be man portable and should connect the GFAC and close-support-adapted F-35s so that they form an integrated system.

Because F-35s will also have to perform the FAC(A) role, they must be capable of seamlessly passing this information to other aircraft. No doubt the aircraft will be able to use the most current version of Link 16. System avionics must capitalize on this link, or a gateway when necessary, to pass critical targeting data to inbound bombers and fighters of the FAC(A)'s choice. It must then confirm accurate receipt of this data and do so via secure means in a jamming environment.

Just as Piper Cubs prowled the lines, spotting for distant artillery (whether shore- or ship-based), so should the F-35 if called upon to do so. Such an ability would amplify the effects of combined arms. The appropriate communication links to Army, Navy, and Marine artillery coordination cells would give the GFAC another route to request artillery fires (through the FAC[A]) and would allow the FAC(A) to adjust that fire for maximum effect.

A weak area in the Anaconda operation concerned limited ability to communicate over the horizon with headquarters or the coalition air and space operations center.²³ Incorporation of satellite communications gear would enable the overhead FAC(A) to relay critical requests as well as provide an accurate battlefield picture to decision makers. The aircraft communications suite will prove pivotal in increasing not only its close-support role but also overall battlefield awareness.

Mission-specialized software should greatly simplify the control and use of such gear. A portion of the aircraft's computer-driven avionics should focus on CAS/FAC(A) capabilities. Such systems not only will enable efficient use of multiple radios and data links while communicating with a host of agencies, but also could intelligently narrow the informa-

tion being passed. Given the plethora of data available from onboard and off-board sensors, such as the RC-135 Rivet Joint aircraft and unmanned aircraft systems, that data must undergo heavy filtering before relaying. The best way to smartly tailor this information involves consulting with both aircrews and GFACs during software development. After all, the software must be designed around their needs.

Equipment efficacy, however technically advanced, relies on proper training and proficiency, yet we lack realistic, standardized CAS training. Among other things, this results from the fact that we have few such opportunities and that CAS training occupies a lower priority than other types. Thus, regrettably, "joint close air support missions [are] forced to conduct last-minute training or create ad hoc procedures on the battlefield."²⁴ The proposed GFAC tool and mission-specialized aircraft software that would link air and ground crews are a system—and should be used as such. To truly exercise the proposed air-ground close-support system, we should incorporate Air Force, Army, and Marine FACs into CAS/FAC(A)-specialized F-35 units. This notion encompasses two separate concepts.

The first concept, designating certain F-35 units as CAS/FAC(A), differs from saying that their primary function should be close support; rather, their *only* function should be close support. If the Air Force is to accept its role as the acme of close support, it must field a skilled team of CAS/FAC(A) providers. The F-35 is just hardware and, in and of itself, cannot replace the A-10 weapon system, which consists of the A-10 aircraft and the community of expert aviators who live and breathe close support. Certainly, CAS/FAC(A) F-35 units should receive sufficient training to defend themselves against air-to-air threats, but the focus should remain on close support (as it would if they were flying A-10s).

The second segment of this concept involves recognizing smooth and practiced teamwork as essential to effective close support. The proposed equipment and software would link the F-35 and GFAC in such a way as to make their sum a weapon system. The stakes are high: if this team doesn't perform, then

friendly positions may be overrun—and the risk of fratricide is always a concern. This team cannot attain effectiveness through separate training; its members must prepare for combat together. Currently, Air Force enlisted members and officers work with the other services as enlisted terminal attack controllers and air liaison officers. Rather than change this system, we should expand it, incorporating Army, Navy, and Marine FACs into the dedicated F-35 close-support units as proposed. This can take the form of either a temporary duty rotation or an actual unit assignment—just as long as effective team training occurs. Such a scheme would ensure that both ingredients—GFAC and CAS/FAC(A) pilot—become experts with their equipment. Then, together, they would form a true weapon system. Both would also develop an inherent understanding of the other's requirements, leading to simpler and quicker coordination of close support. The two ingredients shouldn't simply meet on the battlefield or during major exercises. By working together in the same unit, they will develop a synergistic relationship.

Conclusion

The GWOT defines our current enemies, who operate as covert irregulars far from traditional power bases. Our ground forces will continue to seek and engage them in expansive, sometimes rugged and often isolated, areas that can prevent us from assembling traditional combined-arms assets. The Air Force has the ability to overcome these barriers to

provide the advantages of varied and multiple weapons effects inherent to combined arms.

Our service must commit fully to the close-support role, recognizing that close support is its most effective fighter-based, tactical input to the GWOT—now and for the foreseeable future. The Air Force must make a mental shift with regard to its tactical aircraft: close support must eclipse other roles. Our priorities, concept development, and asset allocation must evolve to reflect this shift. The question then becomes how to best support troops on the ground.

Ideally, the Air Force would acquire an advanced platform that would catapult CAS/FAC(A) capability forward as much as the F-22 raised the air-to-air bar. However, it's unlikely that we will begin an acquisition program for such a platform, so we must find other solutions.

One possible remedy involves the F-35, an asset that the Air Force must embrace as the next CAS/FAC(A) provider, equipping it with specialized onboard and off-board equipment for the close-support role. Additionally, we should designate specialized F-35 units as CAS/FAC(A) and imbue them with interservice GFACs to maximize training and ensure seamless operations.

None of this can take place without first accepting close support as the primary tactical responsibility of today's Air Force. Our service must affirm the support of our ground forces as its primary fighter-based role and take action concomitant with this decision. If we are willing to do anything to win this war, then this mental shift must be among the first the Air Force implements. □

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The Air Force can provide Global Vigilance, Global Reach, and Global Power only so long as it possesses robust capabilities in such areas as air dominance; global strike; space superiority; intelligence, surveillance, and reconnaissance (ISR); missile defense; special operations; air mobility; and cyberspace superiority.

—Air Force Posture Statement 2008

Why We Should End the Aviator Continuation Pay Bonus Program

MAJ BRIAN E. A. MAUE, USAF

Editorial Abstract: In 1989, Congress established the Aviator Continuation Pay Bonus Program, originally designed to slow the exodus of military pilots to civilian airlines. By means of historical investigation of military and Social Security sources, the author concludes that this program, though initially a sensible idea, has outlived its usefulness. He points out that a combination of additional special pays, increased service commitments, more trained pilots, and decreased earnings potential for civilian pilots has made this program an anachronism.



A NOTE IN THE Air Force publication *Roll Call* pointed out that extending the length of military assignments from three to four years would produce cost savings that the service could use to recapitalize its equipment, airplanes, and facilities.¹ As Air Force decision makers review the monetary effi-

ciency and effectiveness of the service's other policies, one incentive policy—the Aviator Continuation Pay (ACP) program—appears worthy of scrutiny. Reviewing the historical purpose of ACP and examining evidence from military and Social Security sources suggest that the Air Force should end this program.

The Historical Purpose of Aviator Continuation Pay: Reducing the Airline-Opportunity "Gap"

Enacted in 1989, ACP was designed to slow the exodus of military pilots to civilian airlines—an industry that offered “an alternative lifestyle, better retirement and benefits, and shorter work weeks.”² Congress’s establishment of ACP sought to increase the retention rates of full-time Air Force pilots by making their compensation competitive with that of civilian-airline pilots. Currently, the Air Force offers its pilots an ACP contract of five annual payments of \$25,000 for agreeing to serve an additional five years.

At one time, such a program made sense. After all, the Bureau of Labor Statistics (BLS) identified the annual income and career earnings of civilian pilots as among the highest in the United States.³ A “major” airline—one that earns \$1 billion in revenues annually—offered the most attractive opportunities. According to the BLS’s *Occupational Outlook* report, the median annual earnings of airline pilots, copilots, and flight engineers amounted to \$129,250 in 2004.⁴ Military pilots have competed very well for these jobs due to their thousands of hours of flying experience, as well as their high-quality training in some of the world’s most technologically advanced flying equipment.⁵

The attractiveness of airline jobs to Air Force pilots remains a notable issue in the service’s pilot-retention reports—as has the presumed effect of its ACP program. For example, in 2004 a report noted that “the pilot ACP program will continue to provide a buffer against future airline hiring.”⁶ However, using the ACP program to “buffer” against airline opportunities no longer appears necessary, as the following analyses suggest.

Airline Salary Reports: Disappearance of the Gap after 11 September 2001

During the creation of ACP, the domestic airlines offered recruits the possibility that one day they might become senior pilots earning \$300,000 a year while flying only 14 days each month. Using such earnings estimates as the standard for current airline opportunities, however, is no longer valid—just as the baseline assumption of guaranteed airline employment is no longer a certainty.

Ever since the deregulation of major airlines in 1978, competition has become increasingly intense within the industry, whose members use cost-saving strategies to remain profitable. One such strategy involves acquiring a competing carrier. After a merger, the resulting airline can reduce the previous route overlap of the two former carriers, increase the number of passengers per aircraft on each trip, and enhance profitability. America West’s buyout of US Airways in 2005 reflected this strategy.

An airline may also seek better profits by lowering labor costs—a measure made even more necessary by the events of 11 September 2001 (9/11). As a BLS report of 2005 noted, “After September 11, 2001, air travel was severely depressed. A number of the major airlines were forced to reduce schedules, lay off pilots, and even declare bankruptcy.”⁷ Said US Airways spokesman Rick Weintraub when announcing the layoff of 1,100 pilots at the end of September 2001, “This is part of the sequence of events forced on us by the attacks in New York, and the response of the traveling public to those events.”⁸ Altogether, US Airways laid off approximately 1,800 of the 6,000 pilots it employed before the 9/11 terrorist attacks. “They are cutting pilots to the point where it reaches people who have been here 15 years,” said Roy Freundlich, a spokesman for the Airline Pilots Association.⁹

Northwest and Delta airlines, both of which filed for Chapter 11 bankruptcy status on 14 September 2005, provide recent examples of the major airlines’ troubles. These two, along with United and US Airways, represented 50

percent of US airline capacity.¹⁰ During this time, all of Northwest's pilots who had been with the airline for less than a year were eventually laid off, and Delta's pilots, who had recently accepted a five-year deal that included a 32.5 percent pay cut, accepted an additional 14 percent cut in 2005.¹¹ In aggregate, decreased employment opportunities such as these should have lowered the "average salary" benchmarks to which ACP had once been linked, yet the historical values of the ACP contracts reflect no such updating—those values did not decline.

General Airline- Employment Statistics: Disappearance of the Gap

Due to the strict seniority system within the airline-pilot career field, the industry's hiring rates and furlough levels serve as two broad indicators of career opportunity. All of the 14 major airlines' 63,000 pilots are unionized, and the unions strongly enforce a seniority system.¹² Regardless of previous experience, if

a pilot joins a new airline, then he or she starts at the bottom of the seniority list and pay scales. Seniority also affects how a pilot advances through an airline's piloting ranks, insofar as the first consideration for any promotion is the pilot's initial date of hire. Similarly, seniority influences employee layoffs. According to a report published in 2001,

When a furlough occurs, pilots are laid off in reverse seniority order, beginning at the bottom of the pilot seniority list. When recalls begin, pilots usually return to work in seniority order. Furloughed pilots at unionized carriers have recall rights—the company must recall any pilots off furlough before hiring new pilots. Most pilot contracts stipulate "recall rights"—the maximum number of years a pilot can be on furlough before the company can remove him from the seniority list. Retention ranges from five years to an unlimited number of years, depending upon the airline.¹³

Using data from AIR Inc., I constructed two airline-opportunity charts. Figure 1 displays the employment drop that occurred after 9/11. Prior to that date, major carriers such as American Airlines and United Parcel Service,

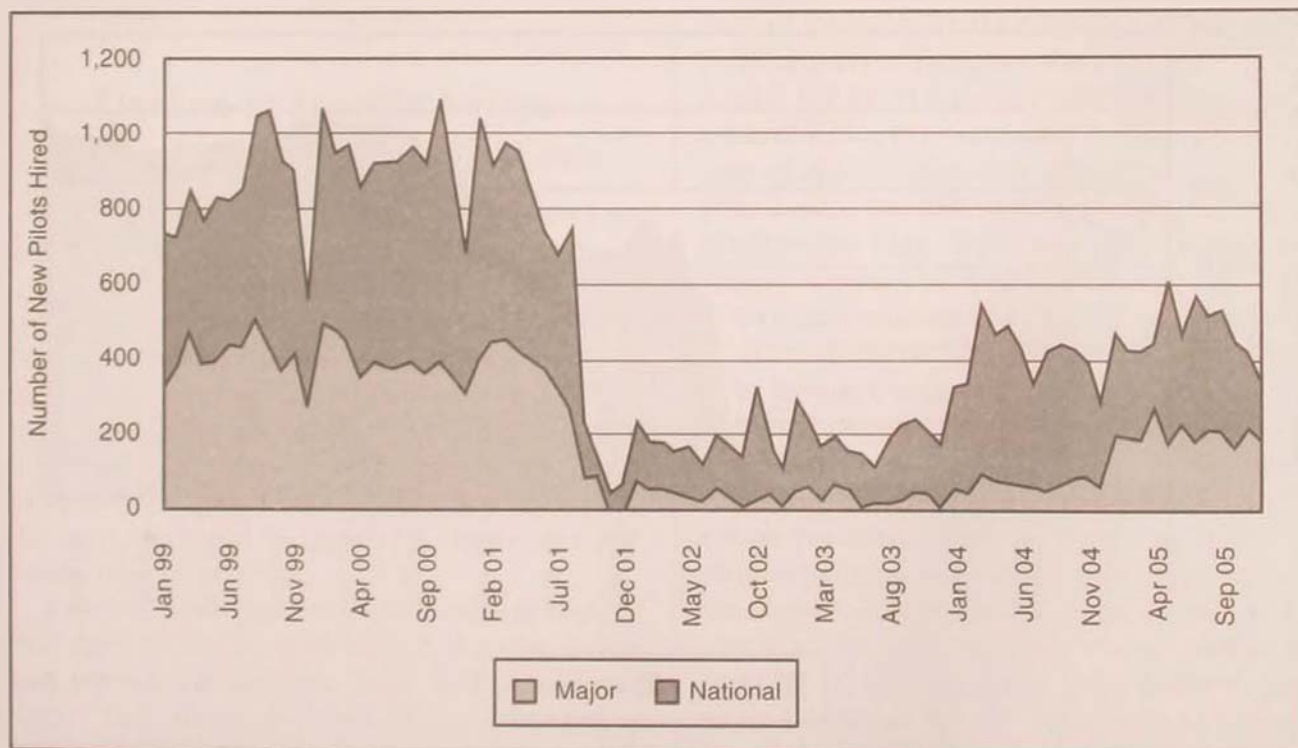


Figure 1. Monthly hiring of new pilots by major and national airlines, 1999–2005

whose pilot salaries used to reach \$100,000 per year by the fifth year of service, hired hundreds of new pilots each month.¹⁴ In 2002 and 2003, however, the average number of new hires per month for major airlines fell under 45.

The next tier of piloting opportunities occurs at the national-airline level. These carriers, such as Jet Blue and Midwest Express, generate between \$100 million and \$1 billion in annual revenues. Although it may take a few more years before a pilot reaches an annual salary of \$100,000 at this level, the national-level carriers had offered employment opportunities to hundreds of pilots every month. After 9/11, though, their hiring rates dropped by an average of 200 new pilots per month.

Figure 2 complements the airline hiring rates by illustrating the number of pilots on furlough status before and after 9/11. Within months after that date, the airlines furloughed thousands of pilots. The largest part of the furlough population—over 8,000 pilots—consisted of major-airline pilots who had recall rights. Thus, military pilots looking to begin an airline career in 2005 would have found it

much more difficult to find employment, and, if hired, they would have faced slower-than-traditional career progression and earnings growth. Compared to the hiring environment during ACP's enactment in 1989, the airline industry has become a far less attractive option.

Airline Pension Changes: Disappearance of the Gap

When an airline such as Delta or Northwest enters bankruptcy, the Pension Benefit Guaranty Corporation, a federal agency, takes over the company's pension plan, guaranteeing only a minimum pension amount and penalizing individuals who retire before age 65. The corporation capped pensions at \$45,613 per year for pension plans cancelled in 2005.¹⁵ Since pilots must retire by age 60, their cancelled plan in 2005 would be capped at \$29,649. For a major-airline pilot, such as a Northwest pilot, this cap could lead to a loss of half or more of a yearly pension previously expected to exceed \$60,000.¹⁶

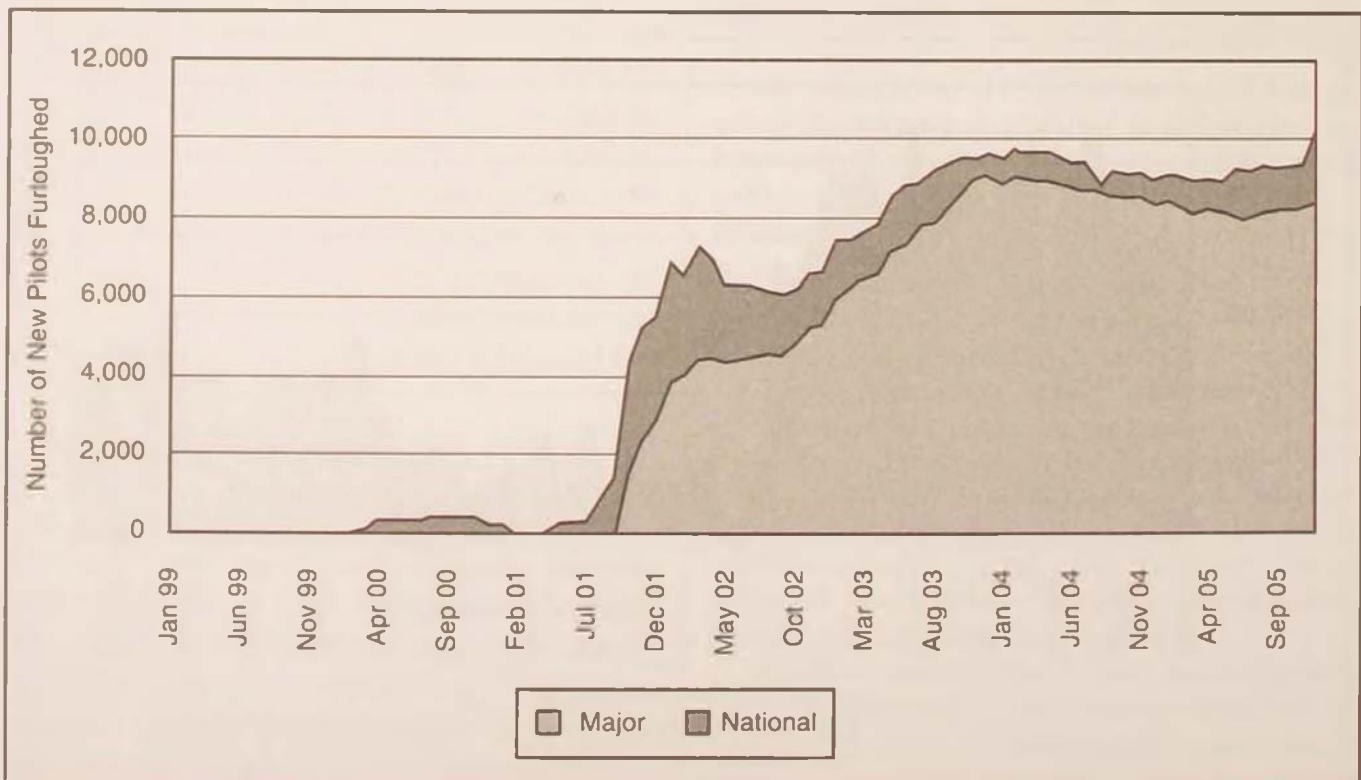


Figure 2. Monthly furlough levels by major and national airlines, 1999–2005

Still, these retired pilots at least would have a “defined benefit” of retirement funds that they could expect to receive during their lifetime. Most of the airlines, however, have since transitioned their retirement programs to “defined contribution” plans whereby, in most cases, they contribute some amount of funds to each pilot’s retirement plan but offer no guarantee of its retirement value—the nest egg may grow or decline in value. This pension change, which contrasts sharply with the military’s guaranteed pension, represents another major difference in airline compensation since ACP began in 1989. As an Air Force report of 2004 noted, “Younger pilots have watched the news and are talking to people who have separated and returned back to active duty. As a result, the prospect of a 20-year Air Force career followed by a government-guaranteed pension has become much more palatable. The certainty of the military compensation is a notable benefit that has become more apparent since 9/11.”¹⁷

The general trends in airline opportunity since 9/11 have taken the form of a decrease in employment and a decrease in earnings and pension values for employed pilots. Yet ACP values do not reflect this fact.

Decline in Specific Airline Opportunity for Military Pilots

Although the airlines generally tended towards reduced earnings potential, perhaps individuals possessing a military pilot’s skills remained above the general employment fray. In order to better determine the opportunities for such individuals, I examined data to ascertain the airline-employment trend of the Air Force’s Reserve Component (RC) pilots—part-time fliers belonging to either the Air National Guard (ANG) or the Air Force Reserve (AFR).

I would have preferred to have tracked active duty pilots as they exited the Air Force and joined the airlines since ACP applies to them and since the Air Force Instruction (AFI) 36-3004, *Aviator Continuation Pay (ACP) Program*, specifically states that ACP does not

apply to ANG and AFR officers.¹⁸ However, such a data set did not exist. Nevertheless, I was able to generate a reasonable proxy of airline impact on military-skilled pilots by examining a database composed of RC service records as well as earnings data from the Social Security Administration (SSA). The RC pilot data came from the Defense Manpower Data Center’s work-experience file.¹⁹

Within this database, the RC pilots of interest served in the AFR and ANG some time during the years 1999–2004 in the ranks of captain, major, and lieutenant colonel, with eight or more years of service. This population loosely reflected the RC pilots who could leave the RC at their choosing, versus not having the opportunity to leave as a result of an active duty service commitment. The RC pilots I studied served at least 50 percent of their recorded time (from the data) in airlift, fighter, or refueling airframes—these three mission areas representing approximately 70 percent of all RC flying activity. The database excluded smaller mission areas, such as special operations or initial flight instruction, due to their small sample size and corresponding constraints that the SSA uses to protect the privacy of an individual’s earnings data. Another population restriction—the fact that RC pilots could *not* be full-time reservists (e.g., Active Guard Reserve)—created a sample population of approximately 4,200 RC pilots for each year. Lastly, the SSA’s process of gathering and quality-checking earnings data resulted in nearly a two-year lag in data availability, so 2004’s information was the latest available.

Having identified the population of part-time pilots, I requested that the SSA uncover whether or not an RC member had worked for a major or national-level airline during that year—specifically, by utilizing the SSA’s employer identification number (EIN) variable, which facilitates identification of an individual’s employer(s). Therefore, to find out if an RC pilot worked for an airline during one of the calendar years 2000–4, I submitted EINs of the 21 major and 44 national-level carriers of that period to the SSA for employment matching.

Figure 3 shows that 70 percent of RC pilots received paychecks from such airlines in 2000. This statistic closely resembles the airline-employment estimates calculated from a second source—the Status of Forces: Reserve Component (SOFRC) survey for the year 2000. I analyzed the subset of respondents made up of Air Force RC pilots (by means of a unique pilot identifier) and found that 75 percent of them stated that they were pilots or navigators in their civilian jobs. Given the possibility that the RC pilots worked for charter-plane services or other non-top-tier airlines, the 5 percent difference between the SOFRC and EIN-matching results appears trivial. The similarity between the two sets of results supports my assertion that the EIN-matching technique accurately reflects employment trends among airline pilots.

The EIN matching in figure 3 shows that the percentage of RC pilots employed by civilian airlines gradually dropped to about 50 by 2004, coinciding with the general trend of layoffs and decreased opportunities within the top two airline tiers. This suggests that individuals with a military pilot's skills were subject to the same downward trend in airline opportunities as the general population of pilots. It is worth noting that the part-time RC pilots depicted in the figure would most likely have

built up some seniority within their airline (e.g., eight or more years). Thus, the illustration understates the reduced level of opportunity for someone wishing to become an airline pilot for the first time. The fact that over 8,000 major-airline pilots with recall rights were on furlough during this period made the quick employment and advancement of a new airline hire unlikely.

Decrease in Specific Wages for Military Pilots

A Defense Manpower Data Center report summarizing the results of the November 2004 SOFRC showed that the top two (of 17) most widely selected factors affecting the continuation decisions of all RC members were “pay and allowances” and “the military retirement system.”²⁰ Unfortunately, this listing did not include a “strength of preference” indication that would have showed the extent to which pilots preferred these two factors over the other 15.

Still, it did suggest that individuals value pay and benefits as top priorities when they consider working for an employer. It seems reasonable to assume that people will attempt to optimize their employment opportunities,

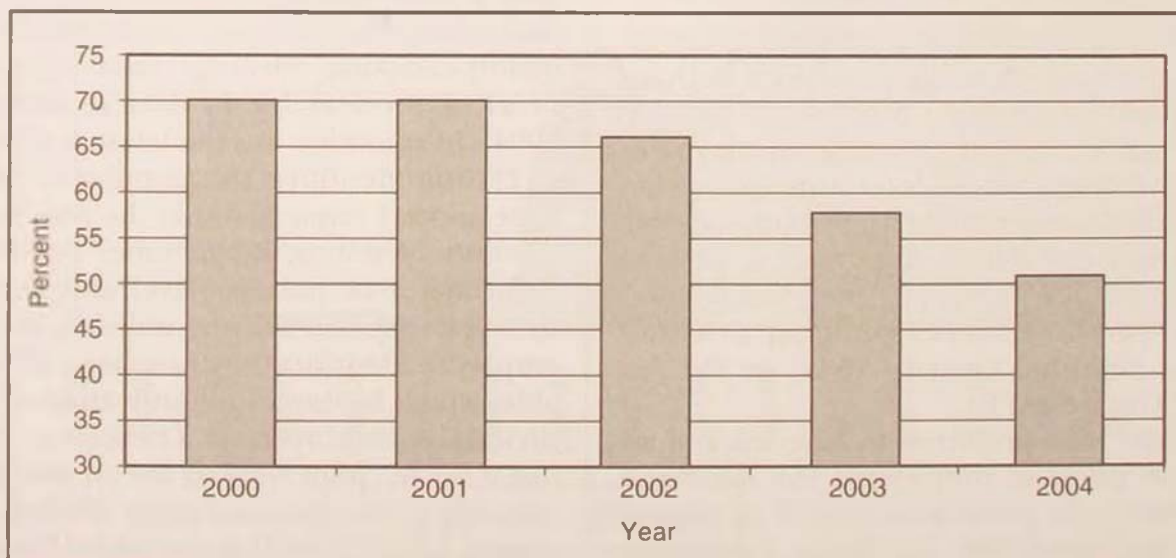


Figure 3. Employment of Reserve Component pilots by major and national-level airlines

with pay a major influence. With this in mind, I explored the earnings information of part-time RC pilots also identified as airline employees. Not all-encompassing, this data did not account for benefits received by an "RC employee," such as base-exchange privileges and accumulation of RC retirement points—or for the higher "at home" expenses incurred from overnight airline flights or temporary military duties, such as higher child-support costs. Still, as I will show, the earnings investigation told a consistent story.

To better understand how earnings changed for pilot-skilled individuals, I constructed figure 4 using grouped administration data from the Defense Manpower Data Center and the SSA. As a crude attempt to control for some of the earnings issues associated with age and seniority, the figure displays the before-tax earnings averages (including combat-zone tax exclusions) of part-time RC pilots, based upon three different "years of service" groups: (1) junior, those with eight to 14 years of military service (approximately 30–36 years old); (2)

middle, those with 14–19 years of military service (approximately 37–42 years old); and (3) senior, those with 20 or more years of military service (approximately 43 years old or older).

Figure 4 also shows the BLS-reported earnings averages for airline pilots identified by Occupational Employment Statistics code 53-2011, "Airline Pilots, Copilots, and Flight Engineers." The BLS average shows a continuous, albeit gradual, rise in pay—most likely due to a "survivor bias." (As the airlines laid off their junior workers, the average salary calculated would be based upon the remaining pilots, who were more senior and earned higher salaries.)

Given the magnitude of the airline furloughs and the resulting survivor bias, one would expect a similar trend of gradually rising earnings within the airline-pilot subpopulation of RC members. Yet their earnings lines differ from the BLS average, leveling off and dipping over time, which suggests that earnings, even when biased upward by a survivor effect, were cut significantly enough to appear

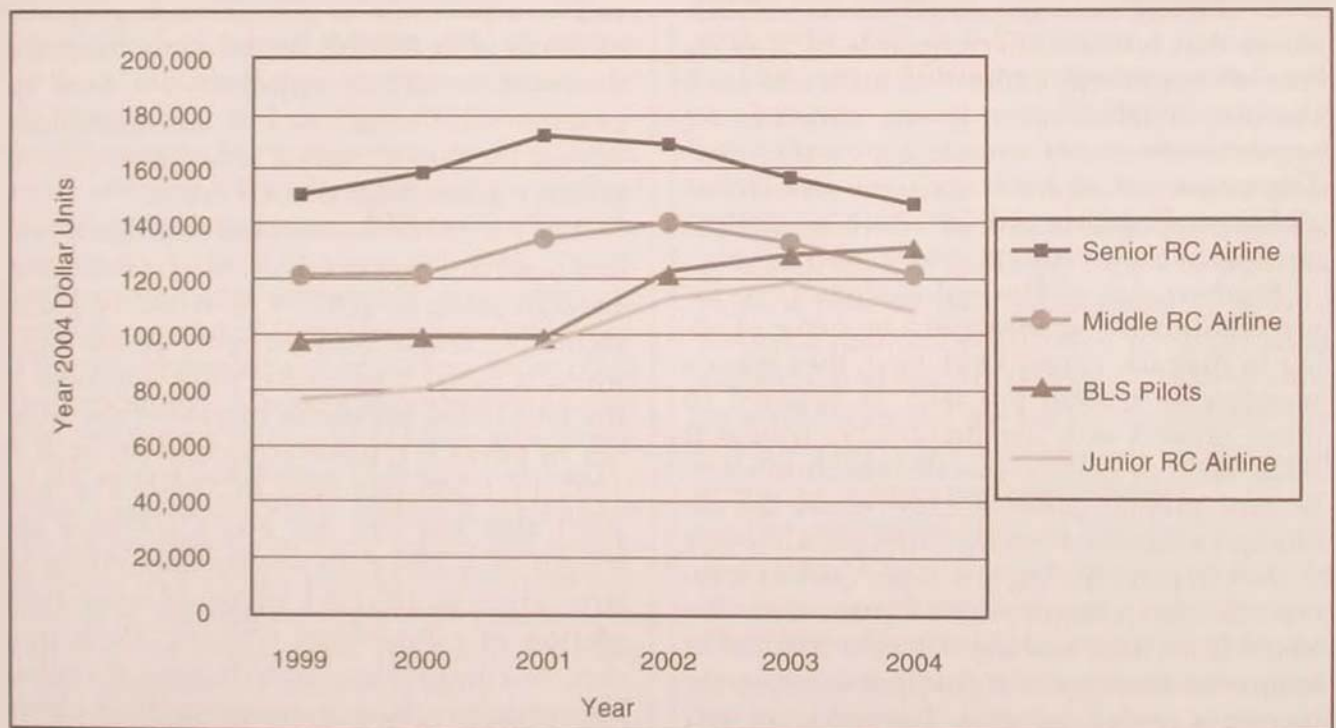


Figure 4. Annual earnings of Reserve Component pilots working for airlines

as decreases. Each of the RC airline categories showed a trend of downward earnings by the year 2004, despite an opportunity to work for two employers.

In summary, using EIN matching to uncover airline opportunities revealed that pilot earnings did not always increase and that airline employment was not always assured, even for individuals with military-pilot skills. A large fraction of RC pilots who also worked as airline pilots at the beginning of 2000 experienced a decrease in airline employment and pay opportunities following 9/11. Those who lacked seniority, such as recently separated active duty Air Force pilots, enjoyed even fewer opportunities. Yet during this same period, the value of newly offered ACP contracts did not drop.

Additional, Nonpecuniary Considerations Affecting Air Force Pilot Retention

It seems reasonable to ask what would happen if the ACP policy were eliminated. Would individuals stop flying or applying to fly? It appears unlikely. Strategic-compensation research shows that nonpecuniary rewards such as career advancement, interesting work and work location, a valued peer group, and training opportunities may also make a job attractive.²¹ The mission of an Air Force pilot—which has global implications and for which no civilian equivalent exists—offers these rewards.

Furthermore, military pilots already receive two additional compensations by virtue of being in the pilot career field. First, they learn a transferable civilian job skill, as opposed to other officers with less marketable technical skills, such as ballistic-missile-launch officers. Second, military pilots already receive the additional aviation career incentive pay although it does decline during the latter part of a career. In 2004 a major with 12 years of service would have been making well over \$90,000 in before-tax earnings, and that individual would receive a secure pension, beginning in just eight years. This is competitive with the pay of junior members in figure 4, who needed to

work for two employers to earn their money, had years of seniority built up with their airline, and did not enjoy as many tax-advantaged earnings (e.g., the Air Force's basic allowance for housing).

Why, then, might a pilot leave the Air Force? In the past, a subpopulation of military pilots left due to the rigors of high operational tempo. They separated from the Air Force even when the ACP option was in place, suggesting that its financial incentives did not affect their decision. One way to mitigate this outflow of pilots would involve increasing the total number of pilots in order to lower deployment rates. The Air Force, however, should consider this very expensive option only within the portfolio of many pilot-stabilization alternatives.

Although the actual size of the "too many deployments" population remains unknown, we do know that over 60 percent of the eligible ACP pilots did *not* accept the ACP contracts of five or more years in fiscal years 2000 and 2001. However, by fiscal year 2004, that trend had reversed itself, and ACP acceptance rates approached 70 percent, certainly in part due to the patriotic response of pilots after 9/11.²² At the same time, the decrease in airline opportunities now appears a valid additional, if not dominant, reason for the decreased separation rates of military pilots from the Air Force.

The Air Force has enacted additional policies in an attempt to ensure that it maintains enough pilots to achieve its vision of global vigilance, reach, and power. For example, when it faced a potential pilot shortage in the late 1990s, it steadily increased the number of pilots it trained from 650 per year in 1997 to 1,100 per year in 2000. The year 2000 also saw the Air Force increase the length of active duty service commitments from eight to 10 years, incurred upon completion of pilot-school training. Both policies, in conjunction with decreased civilian opportunities, have more compelling claims that they—not the ACP policy—have created a more stable pilot force.

Limitations, Implications, and Future Directions of Research on Air Force Compensation

Like the preponderance of other research, mine did not attain a full perspective of the situation. For example, I would have preferred to have examined more recent earnings data, but the SSA's process of gathering and quality checking produced a nearly two-year lag in information availability. Additionally, the effect of the expanding force of unmanned aerial vehicles has not yet been integrated into pilot-compensation research.

Still, my exploration of civilian pay revealed that the specific earnings opportunity of a civilian airline pilot, with regard to both annual compensation and future pension benefits, has been decreasing. Yet the fact that ACP contracts have not decreased suggests that that program is an anachronism—the product of a time when many airlines could entice pilots with a \$300,000 salary for 14 days of flying each month, along with the promise of a lucrative pension.

Because the career-specific incentive pay of ACP emerged during a time when military compensation lagged behind that of civilian airlines, the Air Force should reexamine the ACP program, and perhaps the Aviation Career Incentive Pay program as well, to determine whether it is still necessary. One method would entail expanding EIN-matching techniques to include viewing the employment and earnings opportunities of pilots who have recently separated from the active duty force. This would enable policy makers to uncover the percentage of separating pilots who either join the airlines or take nonairline jobs, as well as the amount of money they earn (within the constraints of the SSA). Although the airlines no longer appear to be a significant benchmark for ACP values, perhaps some other profession is. We should apply EIN matching to other, recently separated, Air Force Specialty Code categories of officers as well.

Proponents of ACP will most likely point to the airlines' recent hiring of a few hundred new pilots in 2007 as a sign that furloughs

have ended and that airline "recovery" has begun. The very concept of what that recovery might look like must be redefined in light of the evidence uncovered during this research. The increase in the number of low-cost airlines, the bankruptcy and merger activities of major airlines, and the industry's efforts to reduce the cost of labor all suggest that airline-compensation packages from any future recovery will be far less appealing than they were when ACP was enacted in 1989. As a recent *New York Times* article pointed out, pursuing some grand airline opportunity is like "chasing a dream toward a disappointing reality."¹³ Just how much has the airline opportunity decreased? In that same article, Paul Rice, a vice president of the Airline Pilots Association, noted that in previous decades when a temporary layoff ended, nearly 100 percent of the furloughed pilots returned to the airlines. In contrast, since 9/11, 30 to 35 percent of the furloughed pilots have not accepted the offer of their old airline jobs, which reflects how much less attractive an airline-pilot career has become. Yet military ACP contracts have not taken into account this decreased opportunity within the civilian-airline sector.

Last, some ACP advocates have stated that the program pays for itself if it persuades only a few dozen pilots to remain in the Air Force, since that retention saves the service millions of dollars by not having to train replacement pilots. Given the findings of my research, the onus is now on ACP proponents to provide evidence that, without an ACP program, some individuals would not become Air Force pilots or would leave the service for the airlines (versus an alternative explanation such as the tempo of operational deployment).

The preponderance of the evidence suggests that ACP pay is unnecessary and that the Air Force could use the funds more effectively elsewhere. Specifically, it could apply money saved from stopping ACP expenditures to specific war-fighting policies such as increasing imminent-danger pay or recapitalizing equipment and facilities. □

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Global Vigilance, Global Reach and Global Power grant Joint and Combined Force Commanders the ability to safeguard the Homeland, assure allies, dissuade opponents, and inflict strategic dislocation and paralysis on adversaries—all while minimizing the loss of life associated with land warfare.

—Gen T. Michael Moseley
 CSAF White Paper, *The Nation's Guardians: America's 21st Century Air Force*



Red Rogue: The Persistent Challenge of North Korea
by Bruce E. Bechtol Jr. Potomac Books (<http://www.potomacbooksinc.com>), 22841 Quicksilver Drive, Dulles, Virginia 20166, 2007, 288 pages, \$23.96 (hardcover).

Deciphering the enigma that is the Democratic People's Republic of Korea (DPRK) has become somewhat of a cottage industry, even more so now that the Hermit Kingdom has become the newest member of the family of nuclear powers. The general consensus among Korean scholars is that, far from perpetuating the popular madman myth, Kim Chong Il and the North Korean leadership have adroitly leveraged their limited options to skillfully employ the art of brinkmanship, with the effect of driving the political and military agenda of northeast Asia to maintain their hold on power, regardless of the negative impact on the North Korean people. In *Red Rogue: The Persistent Challenge of North Korea*, Bruce Bechtol updates this thesis by expounding on how the North Koreans have changed their military, diplomatic, and economic strategy since 11 September 2001 to achieve these ends.

Bechtol acknowledges that the nuclear situation in the region has become more critical but believes it is a mistake to concentrate efforts solely on weapons of mass destruction. Although the author con-

cedes that the North's weakened military makes forced unification of the peninsula under a communist regime unlikely, he contends that the DPRK's conventional forces still pose a considerable threat and can influence the political environment. Bechtol points out that the concentration of artillery and rockets aimed toward Seoul can be as much a deterrent as nuclear warheads. His analysis of a 2002 naval skirmish between North and South Korean vessels further supports his point. Bechtol submits that the clash along the Northern Limit Line separating the two countries off the western coast was most likely neither a navigational error by the North Korean sailors nor a staged confrontation by military hard-liners opposed to Kim Chong Il's policies. Rather, the naval engagement was almost certainly a deliberate provocation by the North Korean leadership. He extols several possible motives for the North Korean decision to initiate the scuffle, to include highlighting the disputed border, and suggests that the timing of the event to correspond with Seoul's hosting of the World Cup soccer games supports his theory. Bechtol also provides a comprehensive study of the DPRK's nefarious international business enterprises, perhaps one of the least-covered aspects in the study of North Korea. He does an admirable job of describing how the North Koreans depend on selling illegal drugs and counterfeiting US currency and American cigarettes to prop up their ailing economy and applauds the efforts of international law enforcement to deal with these issues. But he laments the failure of the US State Department to confront the North Koreans for fear of complicating efforts to reach a nuclear agreement.

In the debate of engagement versus isolation of North Korea, count Bechtol among the supporters of the latter policy. *Red Rogue* was published prior to both the South Korean presidential elections in 2007 and the shutdown of North Korea's Yongbyon nuclear facility in July 2007. One can surmise, however, that Bechtol would approve of the election of Lee Myung-bak of Korea's conservative Grand National Party and would be wary of North Korean promises of compliance. He sees no concrete benefit to the Sunshine Policy practiced by the last two liberal South Korean administrations of Kim Dae Jung and Roh Moo Hyun, maintaining that a demonstration of good faith by the North Koreans is required prior to any engagement with the rogue

regime. North Korea's tardiness in implementing conditions spelled out in the joint statement may validate his recommendations.

Bechtol's experience in the Marine Corps and Defense Intelligence Agency, as well as on the faculty of the Marine Command and General Staff College, gives his work a military perspective often lacking in strategic analyses of the Korean peninsula. His research can be characterized as extensive since he utilizes numerous primary documents, the majority of them accessed through Internet sites. But firsthand interviews, noticeably lacking here, could have corroborated many of his assertions.

Readers should have a firm grounding in the recent history of the Korean peninsula, for Bechtol explains little of the causal factors that have led to the current situation. He only obliquely refers to the Agreed Framework of 1994 when explaining events that led up to the current state of nuclear negotiations with the South. He correctly points out that the Kwangju uprising in 1980 was the seminal event that characterized antagonistic civil-military relations in the Republic of Korea, but his scant summary of the unrest leaves an uninformed reader with more questions than answers. Bechtol ponders the question of who would succeed Kim Chong Il as leader of the DPRK, with no description of Kim's own succession experience as a possible model. Nowhere in the book does he mention *juche*, the ideological philosophy of self-reliance that has driven North Korean domestic and foreign policy for over a half century.

Despite these deficiencies, the informed reader who requires updated information will find *Red Rogue* a succinct account of the current threat and subsequent policy concerning North Korea. By concentrating on the North's actions that earned it a place as one of three charter members of the "axis of evil," Bechtol provides ample ammunition for critics of an engagement policy toward the DPRK. I urge readers to peruse this book without delay, however, because the dynamic nature of the region may render much of the author's current analysis moot in a short period of time.

Although one may disagree about whether the carrot or the stick is the more appropriate method when dealing with the North Koreans, few would dispute that the stability of the Korean Peninsula is vital to American interests. With the global war on terror and conflicts in Afghanistan and Iraq capturing the majority of the attention of US policy makers, Bechtol provides a potent reminder of that fact.

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Phantom Reflections: The Education of an American Fighter Pilot in Vietnam by Mike McCarthy. Praeger/Greenwood Publishing Group (<http://www.praeger.com>), 88 Post Road West, Westport, Connecticut 06881, 2006, 200 pages, \$44.95 (hardcover).

Phantom Reflections explains how a conservative young fighter pilot went to Vietnam full of visions of glory and patriotism to fight for a just cause yet, after retiring as an Air Force colonel, came to feel that it was all for naught—a waste. Nevertheless, he says it was the "defining experience" of his life.

Mike McCarthy produces this memoir in a splendid writing style. Born in upstate New York into a physician's family, he got his college education (majoring in business) in Florida, but he claims that he had decided to be a fighter pilot at age 10. McCarthy entered the Air Force and graduated from pilot training at Webb AFB, Texas, as the Vietnam War moved towards its climax. He went through crew training in Florida in the F-4 Phantom, arriving at Ubon, Thailand, as part of the 8th Tactical Fighter Wing late in 1967.

McCarthy recounts his eight months at Ubon in some detail, describing the recurring fear of going to North Vietnam and the excitement involved. It certainly was no picnic, and he had several close brushes with death. Yet, through it all he had no doubt that he was engaged in a just war and that he was doing the right thing for his country. Because of the bombing halt in March 1968, McCarthy could not record 100 "counter" missions to the North although he had combat aplenty. He thus had to spend the last four months of his Southeast Asia tour working on the Seventh Air Force staff at Saigon. Among the tours after he returned to the "world" was an instructor job at Homestead AFB, Florida, and the one he cites as the best of his entire career—an exchange tour with the Canadians, flying the CF-104. The author also had a fine experience stationed in Scandinavia and a not-so-fine one (albeit highly educational) at the Pentagon.

Only with the passing of years did McCarthy come to perceive the futility of the Vietnam War, a realization that has caused him to have doubts about the current conflict in Iraq. The book is so well written that I highly recommend it to air warriors/scholars who want an evening of entertainment. If they wish to learn more about the technologies, tactics, and history of the air war over North Vietnam, then Marshall Michel's two works, *The Eleven Days of Christmas: America's Last Vietnam Battle* and *Clashes: Air Combat over North Vietnam, 1965-1972*

might better serve that purpose. (Like McCarthy, Michel was an F-4 pilot in that conflict.)

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The Rise of China: How Economic Reform Is Creating a New Superpower by William H. Overholt. W. W. Norton and Company (<http://www.wwnorton.com>), 500 Fifth Avenue, New York, New York 10110, 1994, 432 pages, \$16.95 (softcover).

Over the past 30 years, China's economy has been resurgent. Recent numbers published by the World Bank indicate that since 1978 China has averaged an annual growth of 9.4 percent in gross domestic product (GDP) and a sixfold increase in GDP from 1984 to 2004; furthermore, in 2004 it represented 12 percent of the world's economy on the basis of purchasing-power parity (second only to the United States) and one-third of global economic growth. China has also attracted hundreds of billions of dollars of foreign investment and more than a trillion dollars of domestic, nonpublic investment. Just a dozen years ago, China barely had mobile telecommunications services. Now it claims more than 300 million mobile-phone subscribers—the most in the world.

There is no mistaking the fact that China has one of the highest growth rates in the world, but what does that mean for other countries—particularly, the United States? In *The Rise of China*, a dense and scholarly work, William Overholt addresses these questions and many more. After reviewing China's ancient and former status as the Middle Kingdom, he quickly lays out facts indicating that, notwithstanding the country's recent gains, it still must overcome extreme third world poverty, inefficient socialist measures, and disparities between the poor and rich. The author also compares China to Russia—the country that most Americans still equate with socialism and communism—arguing that Russia failed and has continued to fail because of its initial reluctance to reform and its attempts to do too much too quickly after having finally decided to reform. Principally, Overholt asserts the superiority of China's long-term strategy of piecemeal political and economic reform, maintaining that it will eventually produce a nation much different from the one we have tended to stereotype.

The author writes exhaustively about China in terms of Hong Kong, international relations, and the United States, acknowledging that market ac-

cess and the treatment of foreign investors present problems for China. Yet he argues that China has its share of legitimate gripes.

Of most interest to military readers, Overholt outlines that a serious difference of opinion exists between those who view China as a quietly brooding aggressor and those who see it as principally interested in the peaceful acquisition of wealth and influence. The author falls into the latter camp, asserting that China suffers from being too closely compared to the Soviet Union and other communist regimes.

He further argues that the United States must be careful not to create a self-fulfilling prophecy through harsh rhetoric and political blackballing, recommending that America maintain its strength but adopt a welcoming economic and rhetorical posture. Additionally, Overholt notes the difference in military expenditures between the two countries, with China spending \$30 billion a year—one-tenth of US outlays at the time. To the author, this symbolizes the United States' upper hand and relative ability to play nice without immediate fear.

The Rise of China presents a wealth of historical, economic, and political facts to the reader. Although slightly dated, the book offers relevant information about political issues and subissues as well as a more-than-adequate backdrop for a balanced and fair study of China.

Maj Rodney D. Bullard, USAF
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Battling Tradition: Robert F. McDermott and Shaping the U.S. Air Force Academy by Paul T. Ringenbach. Imprint Publications (<http://www.imprint-chicago.com>), 230 East Ohio Street, Suite 300, Chicago, Illinois 60611, 2006, 333 pages, \$24.95 (softcover).

When the Air Force Academy was first conceived after World War II, senior Airmen, many of them West Point graduates, modeled the new school on their alma mater. This resulted in an Air Force Academy that copied the curriculum, honor code, fourth-class disciplinary system, and even military-training regimen from West Point—not a bad idea. The honor code and disciplinary system served as solid foundations upon which to base a new military academy. The curriculum was another matter.

Archaic and out of touch with modern military requirements and educational practices, the West Point curriculum offered no electives, and all ca-

dets, regardless of prior college experience, had to take the specified courses. There were no academic majors. Furthermore, mathematics and science dominated the curriculum, with only a small portion allotted to the humanities and social sciences. This did not represent a suitable plan for developing forward-looking Air Force officers. Fortunately, help was on the way.

Col Robert McDermott became dean in 1956 after serving two years as vice-dean. "McD," who had new and radically different ideas, wanted an all-military faculty. To establish academic credibility, however, he worked the Air Force personnel system to ensure it supplied him with officers who already had a master's degree. He also began sending dozens of officers off to school to obtain graduate degrees so they could later join the faculty. To gain further credibility, he pushed to have the academy officially accredited before graduation of the first class in 1959—an unheard-of goal that the school nonetheless met.

As for the curriculum itself, McDermott inaugurated an "enrichment program" that allowed incoming students to validate courses they had already taken at a civilian university. He directed the academic departments to offer electives and then restructured the curriculum to deemphasize math and sciences while boosting humanities and social sciences. This in turn allowed cadets to choose an academic major—anything from aeronautics to history. McDermott's ultimate goal called for the academy to offer an accredited master's degree.

In these efforts, he encountered resistance. Some of it came from other agencies at the academy, but, more significantly, West Point, Annapolis, and the Coast Guard Academy implacably opposed him, fearing being overshadowed by such far-reaching reforms. They lobbied their supporters in civilian academe, the press, and Congress to oppose such "radicalism." McDermott swept all of them aside. He achieved almost all he hoped for although he had to settle for a "cooperative" master's program that saw the academy offering accredited graduate-level courses for selected cadets who, upon graduation, would then complete their master's degree in six to nine months at participating civilian universities. It was a measure of McDermott's success that within a few years, the other academies had initiated such changes themselves.

In other areas, however, McDermott proved less successful. Although the author notes that the dean decried what he saw as an overemphasis on intercollegiate athletics, the seeds for future problems were sown early on. The football team's success—going undefeated and earning a trip to the Cotton

Bowl in the very first year it had a four-year program—raised some eyebrows. In 1965 a cheating scandal at the academy saw 105 cadets expelled, nearly 42 percent of them athletes and 28 percent from the football team. Two years later, another scandal hit, with an additional 46 cadets thrown out—nearly a third of them athletes as well.

Critics identified the problem as an overemphasis on academics, charging that McDermott's changes went too far by pushing cadets into impossible time-management binds as they attempted to make passing grades in increasingly advanced and diverse courses. For his part, McDermott argued precisely the opposite: that an overemphasis on athletics, especially a football program that aspired to play nationally ranked opponents on a regular basis, was the culprit.

Surprisingly—and I don't think Ringenbach explores this issue deeply enough—McDermott and his faculty escaped from these scandals largely unscathed, despite the fact that both occurred in their domain. Instead, the superintendent, commandant, and athletic director soon left under clouds. McDermott retired in 1968 after 25 years of service and then went on to even greater success as president of the United Services Automobile Association.

Overall, *Battling Tradition* is a thoroughly researched and insightful look at a driven man who left an indelible stamp not only on the Air Force Academy but also on the other service academies. Although this biography will appeal mostly to academy graduates, there are important lessons here for all officers, regardless of service, concerning military education, discipline, and the dynamics of change in a military organization.

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On Call in Hell: A Doctor's Iraq War Story by Cdr Richard Jadick with Thomas Hayden. New American Library, a division of Penguin Group (<http://us.penguin.com>), 375 Hudson Street, New York, New York 10014, 2007, 288 pages, \$24.95 (hardcover).

I first heard about Cdr Richard Jadick's story in the 20 March 2006 issue of *Newsweek*, so when he wrote a book about his experience with the 1st Battalion, 8th Marine Regiment (1/8) in Fallujah, Iraq, I just had to buy it. I read *On Call in Hell* in one day and enjoyed it from beginning to end. My reactions ran the gamut from laughing to crying as Jadick and Thomas Hayden describe Jadick's expe-

riences as a battalion surgeon during the battle for Fallujah in November 2004 and how he got to that point in his life.

The book begins on the day that marines kicked off Operation Phantom Fury to clear the city of insurgents. A call came in to pick up a wounded force-reconnaissance corpsman who had been shot near the city's cultural center, so Jadick jumped into a Humvee driven by Lt Matthew Kutilek, leader of 3d Platoon, Weapons Company. "I couldn't go in alone, but I didn't want to send the Marines in alone either—and although he looked bewildered at first, he shrugged and accepted that I was going along for the ride. I could have sent in a senior corpsman, but I didn't want to do that either. For one thing, a leader has to be willing to take the same risks he's asking his men to take. And although I had trained my corpsmen well, I had seen sucking chest wounds before and they hadn't. I figured I would be in and out in 15 minutes" (pp. 15–16). This run marked the beginning of a harrowing and emotional journey for Jadick and his 54 Navy corpsmen.

Just as the narrative pulled me into the upcoming battle, so did it take me back to how Jadick became involved with the military in the first place. Although he lost an appointment to West Point because of a wandering right eye, he received an ROTC scholarship from the Marine Corps to attend college, spending 10 years in communications before leaving the Corps to enter medical school.

Jadick tells how he and his assistant battalion surgeon at his first assignment developed the concept of the forward aid station, which brings medical attention to the wounded at or near the front lines. Jadick took this idea with him to his next assignment where he sold it to the senior enlisted man in his new organization, who helped Jadick "hone the leadership and requisitioning skills [he] would need to put it into action in Iraq, and [they] worked together on figuring out how to really make it a part of battalion combat medicine" (p. 82).

Finally, the book explains why Jadick's concern about evacuating wounded marines made him think about putting his concept into practice. According to his account, operational plans had considered actual combat but not how to treat and move the wounded. "I couldn't trust my guys to a system I didn't understand, a system that might or might not be able to guarantee that they get the very best care we could possibly provide. There was no way I was going to be okay with that, for the sake of my Marines, and honestly, for the sake of professional and military pride as well. I had done too much and come too far, and so had my Marines, to

put up with a haphazard, notional approach to casualty evacuation" (p. 147).

Near the end of the book, the authors return the reader to the battle in Fallujah. The narration details how Jadick brings medical care to wounded marines. "I couldn't control who got hit or where, but I still had my sphere of influence, and I decided that if it was taking too long to get the wounded out of the city, then the only way we could cut that travel time down was by moving ourselves in. That would mean, in effect, setting up an emergency room in the middle of the hot zone" (p. 162). To do that, Jadick sought and received permission from his chain of command to set up the forward aid station in Fallujah.

The 1/8 pulled out of Fallujah in December 2004, along with Jadick and the corpsmen who worked with him. In January 2006, Jadick accepted the Bronze Star with "V" device for valor—to that date, the only doctor in Iraq to earn that combination. Jadick was credited with saving the lives of 30 marines who might have died had he and his corpsmen not followed them into the fight.

Well written, *On Call in Hell* is certainly worth reading. One caveat: readers averse to coarse language should be advised that the book does contain some profanity.

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Seeing the Elephant: The U.S. Role in Global Security by Hans Binnendijk and Richard L. Kugler. National Defense University Press and Potomac Books (<http://www.potomacbooksinc.com>), 22841 Quicksilver Drive, Dulles, Virginia 20166, 2007, 336 pages, \$48.00 (hardcover), \$24.00 (softcover).

Professional military education (PME) programs are typically reading-intensive. As any PME student knows, though, it's only a lot of reading if you do it. In *Seeing the Elephant*, PME students have a tool that goes a long way toward reducing that burden.

The authors of this work are well suited for the task. Dr. Hans Binnendijk is director of the Center for Technology and National Security Policy and Roosevelt Chair at the National Defense University in Washington, DC. Dr. Richard Kugler is Distinguished Research Professor at the Center for Technology and National Security Policy. As they mention in the preface, the authors have written the book especially for students attending the war colleges—students who typically have not had the time

to develop a deep-seated knowledge of issues concerning national security and international relations.

The study serves as "an intellectual history of national security thinking since the end of the Cold War" (p. xi). Since that time, hundreds of books have described the international environment in the post-Cold War world and/or have provided a variety of often-contradictory prescriptions for a new national security strategy. *Seeing the Elephant* addresses these disparate ideas. Binnendijk and Kugler summarize the ideas from more than 60 books on national security topics and critique them, based on the outcome of real-world events. This may seem a rather simple task, but several qualities set their book apart from what might at first glance appear to be a basic review of the literature.

First, the summaries are superb. Although I have not read all of the books addressed in *Seeing the Elephant*, Binnendijk and Kugler's summaries of those I have read are exactly right. They discuss the authors' arguments and rationale without giving short shrift to the subtleties of those arguments, thus providing the reader with a very thorough understanding of each author's ideas.

The second quality that sets this book apart is its organization. The title refers to the parable of the blind men, each of whom touches a different part of an elephant and tries to describe the whole. The reviewed books are arranged in a series of subgroups that involve different parts of the national security elephant. An introductory chapter defines terms and lays out the structure of the study. Chapters 2 and 3 divide works into two camps: (1) "neo-Kantian" for books that describe/prescribe a world heading for the peaceful spread of democratic governments (e.g., Francis Fukuyama's *The End of History and the Last Man*), and (2) "neo-Hobbesian" for books that espouse a traditional realist view of the world (e.g., Samuel Huntington's *Clash of Civilizations and the Remaking of World Order*). Chapter 4 deals with books that address the impact of the Internet and other aspects of technology on national security (e.g., Thomas Friedman's *The World Is Flat: A Brief History of the Twenty-first Century*). Chapter 5 discusses books about US grand strategy, including Joseph Nye's *Soft Power: The Means to Success in World Politics*. Chapter 6 addresses varying US defense strategies, including such works as Max Boot's *Savage Wars of Peace: Small Wars and the Rise of American Power* and Wesley Clark's *Waging Modern War: Bosnia, Kosovo, and the Future of Combat*. In the last chapter, which summarizes information from the previous six chapters, Binnendijk and Kugler put forth their own ideas for US national security policy and

defense strategy, describing the national security elephant as they see it.

Finally, the range of titles selected for analysis—perhaps *Seeing the Elephant's* most valuable asset—also sets this book apart. The authors, of course, have "rounded up the usual suspects," examining works by Graham Allison, Zbigniew Brzezinski, Robert Keohane, John Mearsheimer, and other well-known academics in the field of international security. However, Binnendijk and Kugler have broadened their work to include views and ideas from such nonacademics as Gen Tommy Franks, former commander of US Central Command; *Atlantic Monthly* magazine's Robert Kaplan; and *Newsweek* correspondent Fareed Zakaria. *Seeing the Elephant* belongs in the library of anyone with an interest in international affairs. Those who have not been able to read the works reviewed in this book will get a firm foundation in recent thinking about national security studies, while experts can use *Seeing the Elephant* to refresh their memories on important ideas in the field.

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Airpower in Small Wars: Fighting Insurgents and Terrorists by James S. Corum and Wray R. Johnson. University Press of Kansas (<http://www.kansaspress.ku.edu>), 2502 Westbrooke Circle, Lawrence, Kansas 66045-4444, 2003, 560 pages, \$24.95 (softcover).

Irregular warfare seems to be the hot topic of late in the Air Force. Unfortunately, we as a service have suffered from a lack of good books to educate ourselves on this subject. *Airpower in Small Wars* offers a solution, however. Authors James Corum and Wray Johnson, both former instructors at Air University's School of Advanced Airpower Studies (now the School of Advanced Air and Space Studies), wrote this book to fill the void in serious research about airpower's role in small wars. They provide a comprehensive history of that topic for American military officers and policy makers. In this endeavor, Corum and Johnson succeed brilliantly.

The book covers this specialized role of airpower in the twentieth century, from Pershing's expedition in 1916 to the Israelis' operations against the Palestinians in 2000. The 10 chapters provide a broad survey of airpower's role in small wars, covering the European colonial wars, Vietnam, Latin America, and the Middle East. The authors note that the US Army first used airplanes against an ir-

regular opponent during the Mexican Punitive Expedition of 1916. Ultimately however, the US Marine Corps was the first to take the use of airpower in small wars seriously. Sometimes called "State Department troops in small wars" (p. 11), the marines had extensive experience that led to the publication of the *Small Wars Manual*, a classic 1940s-era Marine Corps manual highlighting lessons learned in small wars of the twentieth century.

Airpower in Small Wars provides a fantastic perspective on the enduring use of airpower, emphasizing that our current interest is nothing new. Unfortunately, it also underscores the fact that we have frequently not learned the lessons of history. One of my favorite passages comes from the authors' examination of the British experience in managing Iraq after the First World War: "If the British government had had a carefully crafted grand strategic plan to alienate the three major groups in Iraq (Kurds, Shiite Muslims, and Sunni Muslims) and to force the whole country into rebellion against their British occupiers, they could not have succeeded more handily" (p. 54). Apparently, history has a way of repeating itself. This book records the successes of airpower when it is used correctly as well as its failings when it is misused.

Corum and Johnson offer the reader superb historical background for decision making in current and future irregular wars; indeed, their book serves as a useful "lessons learned" primer for Air Force leadership. In fact, every Airman involved in planning or employing airpower in current and future irregular wars should print out and post the 11 lessons they mention in the conclusion (pp. 425-37):

1. A comprehensive strategy is essential.
2. The support role of airpower (e.g., reconnaissance, transport, and so on) is usually the most important and effective mission in a guerrilla war.
3. The ground attack role of airpower becomes more important when the war becomes conventional.
4. Bombing civilians is ineffective and counterproductive.
5. There is an important role for the high-tech aspect of airpower in small wars.
6. There is an important role for the low-tech aspect of airpower in small wars.
7. Effective joint operations are essential for the effective use of airpower.

8. Small wars are intelligence intensive.
9. Airpower provides the flexibility and initiative that are normally the advantage of the guerrilla.
10. Small wars are long wars.
11. The United States and its allies must put more effort into small wars training.

I highly recommend *Airpower in Small Wars* not only for members of the Air Force's special operations community but also for all Airmen who contribute or will contribute to the "long war."

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Tempered Steel: The Three Wars of Triple Air Force Cross Winner Jim Kasler by Perry D. Luckett and Charles L. Byler. Potomac Books (<http://www.potomacbooksinc.com>), 22841 Quicksilver Drive, Dulles, Virginia 20166, 2005, 320 pages, \$22.36 (hardcover), \$15.16 (softcover) (2006).

I've never known of another book's title and subtitle that described its protagonist so well. *Tempered Steel: The Three Wars of Triple Air Force Cross Winner Jim Kasler* chronicles the heroic life of this Air Force colonel, a jet-fighter ace during the Korean War and the only Airman in history to receive three Air Force Crosses. This biography is a gripping account of a man whose unparalleled commitment to "service before self" is something we should all emulate.

Written by biographers Perry D. Luckett, a retired Air Force communications officer, and Charles L. Byler, an Air Force veteran who served under Kasler in 1965, *Tempered Steel* reads more like a Hollywood thriller than an ordinary biography. The authors' extensive research of Kasler's life is very apparent, and their powerful writing thrusts the reader into the tail-gun turret of a B-29 with the 18-year-old two-striper over Japan and, later, into the torture chambers of North Vietnam's Hanoi Hilton with the now-40-year-old lieutenant colonel.

Luckett and Byler take the reader on a journey through Jim Kasler's life, from his humble birth to an ordinary family in a small Midwestern town, through his amazing frontline battle experiences in Japan, Korea, and Vietnam. By delving deeply into Kasler's life, showing the reader where the man behind the three Air Force Crosses came from, they successfully avoid writing a typical military biography that chronicles only the defining moments of a war hero's life on the battlefield. For example,

the authors explore the relationship with his wife, Martha, from the time that she "didn't want to date a little guy" (p. 17) through their happy marriage, which produced three children, to those times when his family followed him around the country as he serves his nation wherever he is needed. Luckett and Byler also expose the reader to major turning points, such as the moment the nineteen-year-old Kasler realized his calling in life, sitting in the blister gunner's seat of a B-29 Superfortress, returning to base after a successful bombing mission in Japan: "[He was] looking out over Saipan as they cruised home, when a P-51 fighter came swooping up and popped right in beside them. The pilot waved at him, then peeled off in a roll. Jim thought, *Now that's the way to fly!* From that moment, Jim knew he wanted to be a fighter pilot" (p. 13).

If ever there was an Air Force equivalent to *Saving Private Ryan*, this is it. The book describes every moment in such minute detail that the reader can almost feel Kasler's excitement and adrenaline rush as he destroys his fifth MiG over Korea and shouts over his radio, "Casey, I'm an Ace!" (p. 36). The writing is so convincing and powerful that we can almost feel the intense pain that Kasler felt, cringing as he endures literally hundreds of hours of torture, be it by shackling, whipping, starvation, or physical beatings for refusing to sell out his country by participating in North Vietnamese propaganda. The agony he endures is evident as he writes to his beloved wife while broken and battered, huddled in a jail cell in North Vietnam, praying that he would someday see her again: "What I do or what I am would mean nothing without you to share it with me. I have relived our life step by step in my daydreams and found it a wonderful experience to look back on our years together. I know we are going to have just as many more" (p. 121).

I imagine that Luckett and Byler were at least somewhat apprehensive when they took on this project. After all, it isn't every day that a writer attempts to tell the story of a one-man Air Force or a man who went to Korea as an obscure lieutenant but left with considerable renown.

Kasler received praise from other notable Vietnam War heroes such as Senator John McCain, who stated in an interview, "I mean this with the utmost sincerity. I was no hero. I was privileged to serve in the company of heroes . . . like Jim Kasler. They were the ones who sustained me . . . who will always be my heroes" (p. 180). I believe that the authors have done a commendable job, and, judging by Colonel Kasler's own contributions in an appendix ("Personal Reflection"), where he speaks on everything from the antiwar movement to future aircraft de-

velopment, so has he. I only wish that the book had appeared before 2005. Such a powerful and compelling life story deserved to be told much sooner.

Tempered Steel is an absolutely riveting account of Jim Kasler, a true American hero. I enthusiastically recommend it to anyone, young and old, military or civilian. Any American with a pulse will have a hard time putting this book down, so pick a Saturday and clear your schedule because once you start reading, you won't stop until you are sure that Colonel Kasler makes it out of Vietnam alive.

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The Specter of Munich: Reconsidering the Lessons of Appeasing Hitler by Jeffrey Record. Potomac Books (<http://www.potomacbooksinc.com>), 22841 Quicksilver Drive, Dulles, Virginia 20166, 2006, 160 pages, \$19.96 (hardcover).

Say what you will, hindsight is *not* always 20/20. So argues Jeffrey Record in his book *The Specter of Munich*. It seems that many US leaders—both military and civilian—like to invoke the Anglo-French appeasement of Hitler's Nazi Germany at the Munich conference of September–October 1938. The author begins with a brief look at America's current war and then drives the introduction through a historical review of leaders who have invoked Munich, starting with Harry Truman.

To be sure, this book is not kind to the administration of Pres. George W. Bush, but the reader will need to push past that and look at the valuable analysis Record presents in his chapters. He argues that significant errors occurred in the Anglo-French handling of Hitler's expansionist policies from the mid-1930s through the first declaration of war—errors that, if corrected, might have significantly (certainly partially) changed history. Record hinges most of his book on these key points (p. 8) and proceeds to apply them to current and future endeavors, noting that leaders must

1. correctly gauge enemy intentions and capabilities,
2. have public support for risky military action,
3. ensure consistency between diplomatic objectives and military force posture,
4. have a reasonable quantitative balance of strategic ends and means,

5. properly balance offensive and defensive capabilities, and
6. be predictable (and remain so) in threatening and using force.

It's reassuring that the author first seeks to put British and French actions in the context of the time, successfully arguing in chapter 2 (almost half of the book!) that public opinion tied the hands of Neville Chamberlain and the Anglo-French team (such as that was at the time). He observes that

it is difficult to underestimate the influence of the slaughter of 1914–1918 on official and public opinion in Europe during the 1920s and 1930s. . . . The war had an especially profound impact on opinion in the primary appeasing power of the 1930s, Britain, where vivid memories of the lost comrades and loved ones and the special horrors of trench warfare bred an electorate of which significant segments were either pacifist or unwilling to contemplate the use of force (pp. 13–14).

In France, where World War I was a demographic disaster (p. 15), public opinion fared no better.

A number of other factors, all of which Record discusses in depth, led to the Anglo-French decisions leading up to World War II. In the end, all of these political, military, and psychological aspects combined to deny British and French leaders any realistic possibility that the Western democracies could or would act effectively against Hitler in time to thwart the outbreak of another world war in Europe (p. 65). The author continues, observing that, in hindsight, condemning appeasement is easy; however, looking through British and French eyes during the time, he notes that leaders were working not to start World War II but to avoid war—though *not* at any cost (p. 65).

Record also points out that Hitler was not without error. Overconfidence in his country's capabilities perhaps constituted his greatest mistake. By pushing past the limits of German power, Hitler propelled Germany into a lost war.

The book's remaining pages explore why appeasement failed and why current and future world leaders should be careful to avoid incorrectly invoking Munich. More importantly, Record suggests what world leaders should do, and avoid doing, to prevent the same series of mistakes from happening again. The 1930s offer some valuable lessons for leaders today and the future. The analysis that follows in chapter 4 is compelling.

In the final chapter, Record makes a number of recommendations and observations that any leader, present or future, would do well to review. As mili-

tary leaders, in our capacity to advise our civilian leadership of military capabilities and utility in a particular scenario, we too should take these recommendations and observations equally to heart.

Hindsight isn't always 20/20. It's easy to criticize decisions of the past by pointing to follow-on events. It's much more difficult to put ourselves in a decision maker's place and time, knowing only what he or she knew at that moment, and only then objectively ask if we would have done something differently. The same holds true today. Learning from the past, today's and tomorrow's leaders need to be certain of the information upon which they base their decisions lest they repeat the same mistakes. *The Specter of Munich* is a good read—I strongly recommend it.

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Silver Wings, Golden Valor: The USAF Remembers

Korea edited by Dr. Richard P. Hallion. Air Force Historical Studies Office (<http://www.airforcehistory.hq.af.mil/publications.htm>), Publications Division, 3 Brookley Avenue, Box 94, Bolling AFB, Washington, DC 20032-5000, 2006, 131 pages (softcover). Department of Defense personnel and organizations may request printed copies of Air Force History Office publications free of charge (e-mail: afhso.book.orders@pentagon.af.mil). Electronic version available free at <https://www.airforcehistory.hq.af.mil/Publications/fulltext/silverwingsgoldenvalor.pdf>.

Silver Wings, Golden Valor records the proceedings of the Air Force's commemorative symposium on the Korean War, held on 7 June 2000. Sponsored by the Air Force History and Museums Program, Air Force Legislative Liaison, and Air Force Association, this symposium "attempt[ed] to set the record straight" on Korea as an "absolutely vital victory" in the 40-year-long history of the Cold War, checking communism's spread (p. 2).

The book's contributors touch just briefly on lessons learned from the Korean conflict and how they have been used since. Gen Michael E. Ryan remarks that investments in technology prior to the 1950s had "residual effects" as the United States entered Korea (p. 14), allowing the Air Force to project power in the Pacific with three numbered air forces and over 1,000 aircraft spread from Guam to the Philippines. However, the book fails to list the investments that allowed this expression of American airpower and the ways it became today's expe-

ditionary air and space power. Nevertheless, in Korea the Air Force gained dominance and superiority that carried forward to the war in Kosovo, marking the "beginning of an unbroken record of U.S. air superiority," according to the Honorable F. Whitten Peters, former secretary of the Air Force (p. 18). This air superiority permitted the freedom to attack and maneuver at any time and place of our choosing. Air interdiction damaged roads and bridges, thus halting communist forces in 1950 and again in 1951 after Chinese intervention.

One of the key discussions during the symposium addressed the air dominance that denied North Korea "the ability to use its own attack aviation forces" and that gave the Air Force virtual impunity in conducting attacks against northern targets (p. 28). Introduction of the North American F-86 Sabre—the world's first operational swept-back-wing fighter—played a significant role in achieving this dominance. Lt Gen William E. Brown Jr., a Sabre pilot with the 334th Fighter-Interceptor Squadron during the war, outlines five factors that allowed Sabres to down 793 MiGs at a cost of only 78 US aircraft. However, as Lt Gen Arnold Braswell observes, in the beginning, not only the number of enemy aircraft but also the performance of MiG-15 Fagots threatened our air dominance. General Braswell declares that the one true way to attain such dominance lies in implementing "realistic and continuous training" along with maintaining a "long-range, ground attack" capability (p. 32). In Lt Gen Lynwood E. Clark's estimation, the new theories and theorists who "developed the new combat airplanes and new combat tactics that ultimately became standard" practices within the Air Force represent the greatest contribution made in Korea (p. 55). But *Silver Wings, Golden Valor* fails to elaborate upon these new theories and theorists that led to standardized practices.

Importantly, in the final discussion Lt Gen Chuck Heflebower notes that Airmen need to learn from the past and make appropriate changes in today's practices, citing the example of close air support (CAS) during the war. Making use of lessons from the North African campaign during World War II, Airmen developed and pioneered the CAS we have today. However, the book fails to explain the nature of these lessons and the way they contributed to the development of CAS.

An excellent work that helps readers remember the more than 1,840 Air Force casualties during the Korean War and that gives them a better understanding of an often-neglected aspect of the service's history. *Silver Wings, Golden Valor* belongs on the bookshelf of every serious aviation historian. Today

we must constantly learn from our successes and failures, and we must cultivate what Dr. Hallion points to as the most important lesson of Korea—the resolve that allows Airmen to continue providing unparalleled global vigilance, reach, and power.

R. Ray Ortensie
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Heirpower! Eight Basic Habits of Exceptionally Powerful Lieutenants by CMSgt Bob Vásquez, USAF, retired. Air University Press (<http://www.maxwell.af.mil/au/aupress/>), 131 West Shumacher Avenue, Maxwell AFB, Alabama 36112-5962, 2006, 88 pages, \$8.50 (softcover). Available free from <http://www.maxwell.af.mil/au/aupress/Books/Vasquez/vasquez.pdf>.

Retired chief master sergeant Bob Vásquez's book *Heirpower!* is the perfect guide to help new second lieutenants break bad habits so they can become effective officers. Chief Vásquez, who has worked with many lieutenants fresh out of the Reserve Officer Training Corps (ROTC), officers' training school, and the Air Force Academy, made many observations during his 30 years of service and became very familiar with young officers' flaws. Unsurprisingly then, his very well written book contains numerous useful tips and examples. For instance, in chapter 1 he covers first impressions, recalling how things immediately started off on the wrong foot upon meeting a new lieutenant, whom he describes as "look[ing] terrible" (p. 5). Even though the lieutenant had the appropriate leadership skills and abilities, the manner in which he presented himself to the chief and those within the organization was unprofessional.

The author constantly surprised me with brilliant analogies. I found myself thinking, "Wow! I never would have thought of it that way!" For example, making a point about attitude in chapter 3, he discusses the difference between a thermometer and a thermostat, the former obviously measuring temperature and the latter controlling it. He asks, "Would you prefer be a thermometer, an instrument that assesses the environment . . . or . . . a thermostat, controlling those external things that bombard you and can influence you?" (p. 17). This inspired me to begin taking charge of those events that could distort my performance as an ROTC cadet and eventually as a lieutenant. One statement of his particularly touched me: "If you're *my* lieutenant, I'm not going to let anyone or anything harm you! I'm responsible for your success" (p. 61). Such a comment clearly shows loyalty and devotion.

Although the majority of *Heirpower!* proved quite insightful, a few areas fell short. For example, Chief Vásquez occasionally repeats himself and avoids getting straight to the point. Also, despite the fact that he addresses a young audience, its members are more sophisticated and mature than the average teenager to whom he frequently alludes in illustrating his ideas. Nevertheless, because Chief Bob Vásquez's advice is hard to top, I highly recommend *Heirpower!* to all current and future officers, especially those just starting their careers.

Cadet Luis Santiago

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Billy Mitchell: "Stormy Petrel of the Air" by Roger G. Miller. Air Force Historical Studies Office (<http://www.airforcehistory.hq.af.mil/publications.htm>), Publications Division, 3 Brookley Avenue, Box 94, Bolling AFB, Washington, DC 20032-5000, 2004, 58 pages (softcover). Department of Defense personnel and organizations may request printed copies of Air Force History Office publications free of charge (e-mail: afhso.book.orders@pentagon.af.mil). Online version available free at https://www.airforcehistory.hq.af.mil/Publications/fulltext/Billy_Mitchell_Stormy_Petrel.pdf.

By far one of the most significant figures in Air Force history, Billy Mitchell blazed a path for future Airmen. He proved vital to airpower in its infancy, gaining the attention of the nation and key leaders. Roger Miller captures Mitchell's story comprehensively and eloquently in *Billy Mitchell: "Stormy Petrel of the Air."*

Miller begins his book by setting the stage for the bombing of the former German battleship *Ostfriesland*, an exercise which, some argue, marked the pinnacle of Mitchell's career. This action-packed scene, depicting the validation of his idea that aircraft could sink battleships, grabs the reader's attention. The book then provides background information on Mitchell, providing insight into his future decisions and rationale for making them. Fortunately, it does so without bogging the reader down with details about Mitchell's childhood, giving only the vital information necessary to understand him.

Miller describes the major events and people involved in Mitchell's life, artfully putting readers into the story and thereby allowing them to come to their own conclusions regarding Mitchell's actions. Explaining this history in language that any-

one can understand, the author moves smoothly from one event to another. The numerous pictures and descriptions permit readers to see the faces of the people mentioned in the work, which helps the narrative unfold naturally and quickly.

Although Mitchell was clearly outspoken concerning the need for an independent Air Force, he went too far by declaring unequivocally that airpower would render the other services obsolete. Like any inflexible ideologue, he encountered much opposition, especially from the Navy. When he began accusing various officials of treason, he paid the price by being court-martialed. Mitchell did not live to see his dream of an independent Air Force realized; neither did he experience the repeated refutations of his claim that airpower could win wars by itself.

Billy Mitchell: "Stormy Petrel of the Air" is an enjoyable book. I strongly recommend that anyone interested in airpower should read this fascinating and important addition to the many works about Billy Mitchell.

Cadet Jennifer Walne

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Who Guards the Guardians and How: Democratic Civil-Military Relations edited by Thomas C. Bruneau and Scott D. Tollefson. University of Texas Press (<http://www.utexas.edu/utpress>), P.O. Box 7819, Austin, Texas 78713-7819, 2006, 336 pages, \$50.00 (hardcover).

An enduring question in Western cultures, really since the time of Plato, is how can modern states, especially fragile democracies, maximize the capabilities of their military and intelligence services without significant fear that they will usurp their authorities and undermine the very state that created them? The field of civil-military relations has suffered waning attention in academe in recent years. Editors Thomas C. Bruneau and Scott D. Tollefson contribute to filling this gap in *Who Guards the Guardians and How*.

This book makes a unique contribution in that it approaches the subject of civil-military relations from an institutional perspective, emphasizing the structures that work to ensure a balance between military professionalism and civilian dominance. Bruneau and Tollefson have attracted contributors (political scientists, historians, and one "soldier-philosopher"), all with experience with the military and able to comment on a wide range of topics. The editors include chapters on the role of the military in a democracy, the relationship between

legislatures and defense ministries, ways of reforming intelligence establishments in new democracies, the budgeting process, and military education. In a very lucid and approachable style, the work as a whole and each chapter separately serve as a primer to understanding contemporary issues in civil-military relations in emerging democratic states.

Bruneau and Tollefson's framing concept holds that any "correct" balance between democratic civilian leadership and military effectiveness is subject to context. Looking more broadly, one realizes that this is the heart of democratic governance: the societal dynamism of any given place and time shapes democracy's praxis. The contributors describe to us the multiple institutional structures that may bring about that proper balance of civilian control and military effectiveness. For example, chapter 2 outlines the de facto relationship between legislative-oversight bodies and the militaries of several countries, concluding that in consolidating democracies, the legislatures play too limited a role in military affairs. True to the character of the book, however, the chapter concludes with insights into changing and ultimately improving the civilian-military dynamic. Of particular interest to me was chapter 6, which studied the importance of reforming intelligence and security services in new democracies. This is certainly an understudied aspect in the literature, though the inclusion of this interesting chapter presages that intelligence and security institutions may now be routinely considered in studies of civil-military relations. In fact, agencies that operate in oftentimes shadowy realms are the primary agents in postmodern conflict. This chapter underscores their importance in any study of the security sphere.

Who Guards the Guardians and How focuses on how consolidating democracies deal with the civilian-military *problematique*, but all modern militaries and intelligence services worldwide are now forced to adapt to a range of missions inconceivable in an earlier era: peacekeeping, humanitarian operations, antiterrorism, governance operations, and institution building, to name but a very few. The effectiveness with which the services respond to these missions depends upon civilians fully qualified to provide direction and resources. In short, these new missions require new, universal models and institutions to advance civilian oversight. In *Who Guards the Guardians and How*, Bruneau, Tollefson, and their contributors help show policy makers and practitioners how to shape these new structures.

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Science, Strategy and War: The Strategic Theory of John Boyd by Frans P. B. Osinga. Routledge (<http://www.routledge.com>), Taylor and Francis Group, 2 Park Square, Milton Park, Abingdon, Oxford OX14 4RN, United Kingdom, 2006, 336 pages, \$125.00 (hardcover).

In *Science, Strategy and War*, Frans P. B. Osinga explains the thinking, motivation, and creation behind military strategist John Boyd's theories. He explores how Boyd arrived at conclusions and theorems that have defined American military tradecraft in the twentieth century and that will undoubtedly continue to motivate military thinking at all levels—tactical, operational, and strategic—in the twenty-first century. Examining the papers and texts that Boyd read either as an Air Force officer or, later, as a defense consultant, Osinga assembles a near-complete picture of how his subject created processes, models, and, ultimately, such complex designs as the observe, orient, decide, act (OODA) loop. By studying the lists that John Boyd recommended to his audiences and the notes he left behind, the author allows readers to trace Boyd's creation of such theories as fourth-generation warfare and network-centric warfare.

Osinga organizes his text into four areas: (1) Boyd's professional background, (2) strategic and political settings in the United States, (3) Boyd's study of military theory and history, and (4) his evolving interest in and study of scientific developments and theories. Since the English language falls short in describing some intellectual pursuits, the author uses the German word *Zeitgeist* throughout to explain how societal and scientific theorems influenced Boyd's thinking on a wide variety of matters. He also shows that Boyd used a multidisciplinary approach in his work, borrowing from such fields as the psychology of human cognition, political science, systems theory, cybernetics, anthropology, economics, quantum mechanics, and chaos theory.

This elaborate book demands disciplined reading if one wishes to understand how Boyd constructed his arguments, formulated his strategic discourse, and incorporated various scientific and philosophical concepts from biology and social discourse. Osinga concludes with an examination of how themes, debates, and insights of the day influenced or molded Boyd's strategic thinking. Since Boyd developed the OODA loop and other concepts in what historians have called the postmodern world, cross-references to other events of the day help provide perspective on ideas and motivations that he labored so hard to develop.

This outstanding text suffers from one flaw that has become pervasive in the literature: the use of endnotes rather than footnotes, which requires the reader to look up explanations to the text by flipping between pages—a tiresome exercise. In this time of computer-aided capabilities, this book's design can use some improvement. Nonetheless, any fan of John Boyd should own *Science, Strategy and War*—not a biography but truly a scholarly, in-depth examination of this Airman's thoughts, research, and concepts. Any modern strategist will want a copy.

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Bomber Boys: The RAF Offensive of 1943 by Kevin Wilson. Weidenfeld and Nicolson, Orion Publishing Group (<http://www.orionbooks.co.uk>), 5 Upper St. Martin's Lane, London, WC2H 9EA, 2005, 464 pages, \$39.95 (hardcover), \$12.95 (softcover) (2006).

The bombing of Germany during World War II remains controversial more than 60 years after the war. However, no one disputes that the bombing was long, large, and costly. During the five-year campaign, British Bomber Command's bombers and (later) American heavy bombers unloaded 1.4 million tons of bombs on Germany, wreaking havoc on that country and killing at least a half million German civilians. During this effort, the two American strategic-bombing units (Eighth and Fifteenth Air Forces) lost 6,500 heavy bombers and suffered 60,000 aircrew casualties while Bomber Command losses amounted to 8,000 bombers and 64,000 operational-aircrew casualties.

Journalist Kevin Wilson has written a long, sympathetic account of Bomber Command's operations against Germany in 1943. The author bases his study primarily on interviews he conducted, along with documents and secondary sources. The approach is chronological and anecdotal, seen mostly through the eyes of the aircrews.

Bomber Command began 1943 with high hopes. During that year, the unit's accelerated bomber and training production allowed it to increase its numbers but, more importantly, replace older bombers with the superb Lancaster. As a result, although Bomber Command flew only 10 percent more sorties in 1943 than during the previous year, its larger force and the greater number of Lancasters permitted the ambitious Royal Air Force (RAF) to increase bomb delivery on Germany more than threefold. During that year, the British demon-

strated perseverance and improved capability as they faced and endured heavy losses, bad weather, and tough German defenses that were growing increasingly effective.

There is a macabre monotony to this story: sometimes success (the destruction of Hamburg), more often mixed results (the Dams Raid), but, most of all, grinding losses. Wilson focuses on the human element—the individual experience. This reader was struck by the youth of the Bomber Command crews, their multinational origins, and, most of all, their persistence, despite knowing that the odds of survival were against them.

The author also reveals aspects that have generally been avoided or neglected, such as friendly fire from British bullets and bombs, cowardice (“lack of moral fiber”), and inadequate equipment—specifically, the Sterling bomber, Monica (a radar-detection device that unwittingly revealed the bomber's position to German night fighters), and the lack of ventral bomber protection. Wilson offers a very broad account, from the aviators' harrowing experiences during flight, through attempts to evade capture, actual capture, and survival at sea, to life in Britain between missions. The overall context, much less well told, is one of a unit driving toward the brink of disaster as it suffers crippling losses in air battles over Germany. In brief, Bomber Command was engaged in and losing a war of attrition while suffering its Passchendaele of World War II. As the author correctly notes, for all of their sacrifice and effort, the men of Bomber Command received poor treatment in the postwar years from both their government and people. Certainly, they were not accorded the honors and praise they so richly deserved for their achievement, devotion, and sacrifice.

Wilson's approach and book title force a comparison of *Bomber Boys* with an excellent book on RAF Fighter Command in the Battle of Britain that has a similar title and approach: Patrick Bishop's *Fighter Boys: The Battle of Britain, 1940* (2003). Unfortunately, for a variety of reasons, Wilson's effort does not measure up. Clearly, bomber operations lack the glamour of fighter combat, and the Battle of Britain has a clear focus, in contrast to the much longer and diverse bombing campaign. But the author has created his own problems. By centering on 1943, Wilson drops the reader into the middle of a long, complex, and changing story. His writing is often strained and overdone at points; furthermore, his great reliance on the words of the participants makes for difficult reading. The strict chronological method is partially to blame.

In addition, the British and RAF jargon and slang can be difficult for American readers to decipher. The long text seems to cover the subject but does so again and again. This book required but lacked a skilled editor to focus and consolidate these numerous, similar vignettes. The length and repetition of the book, along with the complexity of the story, demand some analysis and synthesis, both of which are sadly lacking. *Bomber Boys* certainly will give most readers a feel for British strategic-bombing operations in 1943 from the aircrews' point of view, but I doubt that the benefits of gaining this perspective are worth the cost of the volume or the effort required to read it. The bombing campaign, Bomber Command, and, most especially, the bomber boys deserve better.

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Into the Wild Blue Yonder: My Life in the Air Force

by Allan T. Stein. Texas A&M University Press Consortium (<http://www.tamu.edu/upress>), John H. Lindsey Building, Lewis Street, 4354 TAMU, College Station, Texas 77843-4354, 2005, 200 pages, \$29.95 (hardcover).

Allan Stein's *Into the Wild Blue Yonder* is an excellent book about Airmen in World War II. It offers everything from moments when enlisted personnel play tricks on the officers to more sober instances when comrades never return from their missions.

Stein recounts his life using short stories in chronological order, starting with memories of his uncle—a pilot in the American Expeditionary Forces. The author was inspired to share his stories by his wife's great-grandfather, who kept a diary during the Civil War. Stein believed that future generations would benefit from what he had learned during his life.

Called to active duty when he was a junior at Texas A&M University in 1943, Stein was recruited as an aviation cadet, but because of the large number of candidates, some were sent back to college to await an opening at the San Antonio Aviation Cadet Classification Center. The author does not speak much of his commissioning, but we do know that he joined the Coast Artillery Enlisted Reserve under the assumption that he would stay in college. This marked the beginning of a fascinating Air Force career.

After training, Stein reported to Lubbock Army Air Field to receive his assignment. He eventually logged over 347 combat hours and served in eight

major battles in World War II as a B-24 copilot. Later in his career, he flew BT-13s, B-52s, and C-47s. Stein shares memories of daring missions, some comical incidents, moral dilemmas, and the fellowship and friendship he experienced in the Air Force.

At the end of the war, Stein elected to stay in the Army Air Forces since he had dreamed of becoming a military pilot. He later spent a year in Vietnam as an operations officer for the 360th Tactical Electronic Warfare Squadron, which used refitted C-47s to monitor and locate Vietcong units. Although the corruption he encountered in that organization disgusted him, he ended his career as inspector general of the Civil Air Patrol.

One of my favorite scenes in *Into the Wild Blue Yonder* occurred during a routine training mission when Stein accidentally cut off a four-star general in the traffic pattern. Specifically, another B-17 flew in front of him so that he could not land. Thinking that the pilot was just another instructor, he turned inside of him on the base leg so that he could not land either. Just as Stein committed to his turn, he discovered that the pilot of the other B-17 was Gen John Cannon, who was yelling at the tower, "Get his number! Get his number!" (p. 83). Stein put his plane on high cruise power and headed south as fast as he could. General Cannon chased him for a while, but Stein's plane was lighter and faster. After landing, the general made a big deal about the incident, but no one admitted to it. Cannon retired soon after, and Stein was never disciplined. He jokingly says, "In the Air Force you have never really lived until you have cut a four-star general out of the traffic pattern" (p. 83).

Not all occasions were fun and games though. During Stein's time as an airdrome officer, he received a call from a tower operator one night about a B-17 that had crashed south of Barksdale and was burning. Stein asked around to see if any of his pilots had taken off that night, and he was told no. He was puzzled about where the B-17 had come from. By this time, all the maintenance crews were reporting for duty, so Stein asked the line chief in charge if any B-17s were missing from the hangar. The line chief could account for all but one. An investigation revealed that two crew chiefs had drunk heavily and decided that if a cadet could fly a B-17, they could too. They went to their planes and were going to fly formation. One of them sobered up and realized that if he took off, he would either end up in jail or the cemetery. The other B-17 crew chief died.

Stein also spent six weeks on grave-registration duty, a program whereby the United States brought men who had been killed and buried in foreign

countries during World War II back to their families. Stein escorted the bodies of the fallen Air Force men home. He explains that this duty was one of the most difficult but rewarding he ever had.

Overall, *Into the Wild Blue Yonder* was intriguing and enjoyable. All of the author's vivid, exciting narratives brought back memories of times when I used to sit with my mom and listen to her stories about my grandfather's Air Force career. I strongly recommend this book to anyone who has an interest in flying or simply wants to know more about the Air Force. Allan Stein's life story makes for an insightful and enjoyable read, especially for anyone who wants to become a military pilot.

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Regional Guide to International Conflict and Management from 1945 to 2003 by Jacob Bercovitch and Judith Fretter. CQ Press (<http://www.cqpress.com>), 1255 22nd Street, NW, Suite 400, Washington, DC 20037, 2004, 400 pages, \$118.00 (hardcover).

Jacob Bercovitch and Judith Fretter's *Regional Guide to International Conflict and Management from 1945 to 2003* is a must-have for people framing the environment of their next potential deployment. This book serves not only as a reference of more than 343 conflicts in the post-World War II era but also as a primer on managing international conflict. The authors, instructors at the University of Canterbury in New Zealand, started the project over 20 years ago and have continually updated conflict summaries. Their adept handling of a subject of such large scope is reflected in the regional and chronological breakdown of individual incidents. *Regional Guide* highlights spikes in tensions between countries as well as situations that precipitated violence.

The authors note that conflict contains single or multiple parts of interstate armed conflicts, internationalized civil wars, and militarized disputes. They divide the book into three general divisions: an overview of international conflict, regional breakdowns of conflicts, and appendices. The first 50 pages give careful attention to management of international conflict; the next 250, the bulk of the work, include summaries of the world's conflicts (which indicate whether or not mediation was attempted and whether or not it succeeded), divided into regions of the world; and the final 40 pages or so consist of reference material, including explanations of the United Nations and major regional or-

ganizations such as the Organization of American States and the Arab League.

The first section summarizes current trends of thought on the nature and management of conflict. In addition, it details international and regional organizations involved in mediation and conflict resolution. The authors briefly touch on causes of conflict, citing the Cold War, decolonization, and ethnic strife as major areas of concern during the last 60 years. They give terrorism only superficial treatment as a fringe phenomenon. Furthermore, Bercovitch and Fretter analyze patterns of conflict, concluding that "although the absolute number of conflicts have risen, the number of conflicts *in progress* have been declining since the mid-1980s" (p. 9). Additionally, patterns show that the two most strife-ridden areas of the world are Africa and the Middle East.

The authors point to territory and sovereignty as the two main causes of war (p. 10). Additionally, although countries are willing to go to war, research points out that of 343 conflicts, only 50 resulted in victory for one side or the other (p. 11). On the other hand, over one-third have been partly resolved due to some form of negotiation. One needs conflict management because war is expensive and because of the adverse effect on the lives and economies of individual countries and those in the region. In a majority of cases, regional organizations must deal with pleas to rebuild war-ravaged areas. The authors' view of conflict management rests on the assumption that conflict cannot be controlled but only managed or resolved (p. 13). Therefore, it is crucial to develop an appreciation for methods of conflict resolution.

Methods of conflict management, which are as varied as the causes of conflict, include diplomatic, legal, and political means. In turn, styles of resolution include bargaining, mediation, observer/fact-finding missions, peacekeeping, shuttle diplomacy, and international forums for airing complaints. The legal arena makes use of arbitration and adjudication; however, international law seriously retards success. Historically speaking, third-party mediation and negotiation have proven most effective, but fewer than 43 percent of conflicts are successfully arbitrated. On the other hand, the success rate of conflict resolution is not much better, standing at roughly 50 percent.

The heart of the book, the summaries of individual conflict, reveals excruciating detail. The authors examine each region, paying attention to the regional political environment, trends of conflict, and avenues of mediation available or pursued in the past. The shortest summaries are about 300

words in length whereas those for some topics are four times that long. Each summary adequately addresses each conflict without bias.

Lastly, the appendices contain a wealth of information, including a chronological listing of conflicts since 1945, fact sheets on major international organizations, and a plethora of reference sources. The bibliography lists a wide range of books covering over 50 years of the history of international conflict.

Regional Guide to International Conflict and Management from 1945 to 2003 takes on the daunting task of shedding light on the conflict-management process and succeeds in doing so. The authors' professional treatment of research material is reflected in their use of primary and secondary documents. They deliver an evenhanded analysis and give neutral treatment to polarizing topics. Offering readers points of departure for further academic inquiry, this book is a valuable resource for people serious about being prepared for deployments and conflict management.

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Beyond Close Air Support: Forging a New Air-Ground Partnership by Bruce R. Pirnie et al. RAND (<http://www.rand.org/publications/index.html>), 1776 Main Street, P.O. Box 2138, Santa Monica, California 90407-2138, 2005, 214 pages, \$25.00 (softcover). Available free from http://www.rand.org/pubs/monographs/2005/RAND_MG301.pdf.

The US Air Force contracted with RAND's Project Air Force, a federally funded research and development center, to study and recommend ways to improve the relationship between airpower and land power. Specifically, the authors address three questions concerning close air support and its relevance for the future battlefield: (1) How should air attack and ground maneuver be integrated? (2) How should the terminal attack control function be executed? (3) How should ground maneuver / fires and air attack be deconflicted? To answer these questions, the authors effectively use three case studies to formulate their observations and make recommendations for the Air Force and Army to improve their air-ground partnership.

The study is balanced and comprehensive, underpinned by three assumptions. First, experiences in Kosovo, Iraq, and Afghanistan indicate an anemic air-ground partnership. Second, the Army's transformation plan correctly recognizes the changing

nature of warfare, and the Air Force agrees in principle with the plan, provided that the tenets of airpower are maintained. Third, enemy land forces (regular or irregular) constitute the critical target set. To defeat those forces, we need to improve the air-land partnership to field a more flexible and capable air-ground team that leverages each other's unique capabilities. If the reader accepts these assumptions, the study expertly reveals significant issues that both services must address through new doctrine, organization, tactics, and procedures to ensure the successful implementation of the Army's transformation plan.

By detailing recent battlefield trends, the study reveals the parochial seams that exist between the Army and Air Force, which, if not corrected, will inhibit the Army's plan. Placement and use of the fire support coordination line during Operation Iraqi Freedom represents just one example of this seam. The authors correctly argue for replacing this antiquated line with an area concept such as kill-box interdiction, and their description of the latter as practiced during Operation Allied Force and Iraqi Freedom aptly explains why this method of coordinating air and ground operations is superior to traditional control measures.

The authors use the Operation Enduring Freedom and Iraqi Freedom case studies to address organizational and doctrinal issues that inhibited mutually enabling air-ground operations. However, they should have delved deeper into the Iraqi Freedom case study. The air-ground architecture of I Marine Expeditionary Force's area of responsibility (AOR) demonstrated a potential way ahead for such operations. The study as written leaves readers to draw their own conclusions. In my case, I identified lack of trust as the most critical element inhibiting mutually enabling air-ground operations in V Corps' AOR. The study's description of why kill-box interdiction proved difficult there but succeeded in I Marine Expeditionary Force's AOR is compelling. The authors expose the organizational seams between the two services that, if not corrected, will inhibit them from achieving a joint, interdependent force. This example should prompt readers and, more importantly, leaders of the Army / Air Force to ask more probing questions about why this disparity existed. However, the US Navy and its significant contribution of carrier-based aviation and surface fires are not examined. This capability must be considered in order for ground forces to fully leverage airpower dominance in conventional and irregular warfare.

Beyond Close Air Support succinctly addresses the hole left in battlefield command and control (C2)

but falls short in recommendations to fill this critical gap. Concepts such as joint air-ground command and control are a tremendous first step to fill the joint C2 void; however, more can be done to extend redundant, tactical-level C2 throughout the battlefield. As part of their training, US Navy forward air controllers (airborne) (FAC[A]) crews earn qualifications as ground joint terminal attack controllers (JTAC). This critical skill can be leveraged through opening Army air liaison officer tours for these officers. Why not explore the potential for Strike Eagle crews to operate as airborne FACs and air-ground battle managers who operate as an extension of the air support operations center? As FAC(A)s, F-15E crews can leverage their two-man crew, tremendous weapons load, and time on station while simultaneously operating as natural extensions of Air Force JTACs and Army joint fires observers (JFO). This would further ease the burden on these high-demand, low-density career fields and complement single-seat capability currently employed in the F-16 and A-10 communities.

The study comprehensively addresses shortfalls in sourcing current JTAC requirements and accurately predicts problems with sourcing JTACs needed by the Air Force to support the Army's brigade modular construct. The authors are on the mark by recommending disaggregating some JTAC functions to qualified soldiers. The Army-Air Force JFO program is maturing and will address this finding as long as it is properly networked and coordinated. Qualifying Army AH-64 pilots as FAC(A)s in the same way as Marine Corps AH-1W pilots will force a closer integration of rotary-wing aircraft, and fixed-wing aircraft will also help disaggregate JTAC functions—applicable in conventional as well as irregular warfare.

The leadership of the Army, Air Force, and Navy should study *Beyond Close Air Support* and use it as the basis for meaningful discussion to address current challenges in air-ground integration. Even if only a few of the study's recommendations are adopted in the form of joint manning and doctrine, our land and air forces will take a step in the right direction towards building mutually enabling air-ground operations. However, institutionalizing habitual working relationships between ground forces and air forces of all four services instead of the often ad hoc associations offers the solution to achieving joint interdependence and regaining trust. The authors of this book got it right. The real question is, will the Army and Air Force?

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Semmes: Rebel Raider by John M. Taylor. Potomac Books (<http://www.potomacbooksinc.com/Books/Features.aspx>), 22841 Quicksilver Drive, Dulles, Virginia 20166, 2003, 128 pages, \$15.96 (hardcover), \$10.36 (softcover) (2005).

The two best-known naval battles of the Civil War are the clash of the first ironclads at Hampton Roads, Virginia, in April 1862 and the engagement between the USS *Kearsarge* and the CSS *Alabama* off the French coast in June 1864. These battles represented two aspects of the Confederacy's naval strategy to overcome the Union's naval superiority: use ironclad warships to sink the Union's wooden ships blockading Southern ports, and use commerce raiders to divert Union warships from the blockade to protect Union merchant ships. The strategy failed because the Confederacy did not have the industrial base to produce large numbers of ironclads, and the commerce raiders, of which the CSS *Alabama* was the best known, failed to draw many Union warships away from the blockade. Interestingly, many Civil War students would recognize the ship more than they would its chivalric commander, Capt Raphael Semmes, the subject of this biography.

John Taylor, son of Gen Maxwell D. Taylor and author of a number of books and articles, especially on the Civil War, has written an informative and lively biography, a concise treatment of his well-regarded, full-length biography of Semmes. As captain of the CSS *Sumter* and the CSS *Alabama*, Semmes, in just two cruises, struck fear into the hearts of Union merchant sailors and shipowners with the capture of nearly 100 Union merchant ships valued at \$6 million—about 36 percent of the merchant shipping destroyed by the Confederate Navy. Southerners revered Semmes as a hero, and the Union sailors he captured generally respected him. However, Northerners, especially the merchants and shipowners financially hurt by his escapades on the high seas, reviled him as a pirate.

Born in Maryland in 1809 and orphaned at age 10, Semmes received his naval commission in 1826 and served on several naval vessels before the Civil War. During his shore duties, he studied and practiced law to supplement his naval officer's pay. In 1841 Semmes purchased land near Mobile, Alabama, while he was stationed at the Pensacola naval base and ultimately came to consider Alabama his home. During the Mexican War, Semmes spent time in a blockade ship off the Mexican coast and ashore with Gen William Worth, Gen Winfield Scott's deputy. His experience with artillery and keen eye for topography resulted in honorable mention by General Worth on three occasions.

In 1861 Semmes resigned from the US Navy and accepted a commission with the Confederate Navy. From June 1861 to March 1862, he commanded the CSS *Sumter* from the Caribbean, to the Brazilian and West African coasts, and finally to Gibraltar, capturing 18 Union merchantmen while being pursued by six Union warships. From August 1862 to June 1864, Semmes, in the sleek, black-hulled, British-made, and British-manned *Alabama*, roamed the oceans with impunity, outmaneuvering the superior Union Navy until that fateful June day. After losing the *Alabama* off the French coast, Semmes returned to the South, commanded the James River Squadron, and, in the last days of the Civil War, served as an army brigadier general. (The latter appointment made him the only officer to hold flag rank in two services.) The war over, Semmes's fame soon faded, and he died in 1877. Yet in 1894, Kaiser Wilhelm II remarked that Semmes was the greatest admiral of the nineteenth century.

Although the book, written for Potomac Books' Military Profiles series, is a mere 105 pages of text, the reader gets an excellent view of Semmes, the CSS *Alabama*, and commerce raiding on the high seas during the Civil War. From time to time, I detected a hint of partiality for Semmes by the author, but, generally speaking, Taylor provides a fairly objective look at one of the more famous (or infamous, depending on the reader's regional point of view) naval commanders and certainly the most famous warship of the Civil War period. The only other criticism I have is that Taylor presents the epic clash between the *Kearsarge* and the *Alabama* in the book's first chapter, which made reading the rest of the book somewhat anticlimactic. Still, I highly recommend this short biography to anyone interested in either the Civil War or naval warfare.

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Code Names: Deciphering U.S. Military Plans, Programs and Operations in the 9/11 World by William M. Arkin. Steerforth Press (<http://www.steerforth.com>), 25 Lebanon Street, Hanover, New Hampshire 03755, 2005, 624 pages, \$27.95 (hardcover).

In the post-9/11 era, much has changed in the way the United States and other Western countries operate as they fight the global war on terror (GWOT). Government agencies, defense organizations, and intelligence communities within the GWOT have set up programs and operations that

support national interests; many are highly classified and not meant for the general public. A common, accepted means of providing a level of secrecy involves assigning code names to them.

William Arkin, a military analyst with NBC News and an independent journalist with impressive credentials, has taken on this massive subject with a solitary vengeance stretched out over years. The result is his book *Code Names*. Arkin's premise is that too many of these activities and relations hide behind a cover of national secrecy, that no one knows their long-term implications, and that almost no discussion or debate exists on the home front. Equally damning is the fact that America has like arrangements with other nations who respond bilaterally and unilaterally in similar fashion. If the United States wants to remain the beacon of democracy and fairness to its citizens and the rest of the world, this situation is more than Arkin is willing to accept. He strongly believes that an informed citizenry is a prerequisite to wise decision making by its elected and appointed leaders.

The code-naming of US military operations began in the Second World War, primarily for reasons of operational security. As the complexity of the war expanded, compilation of code-word lists numbering in the tens of thousands uniquely identified a vast range of operations and projects. After the war, code-naming became the norm during the prolonged Cold War—but done with the intention of garnering public support for the war. Although a number of these names have carried over to the present, efforts have occurred to restrict their use and limit their exposure. According to Arkin, the government and military after 9/11 have gone over the top by shutting down the openness that was standard operating procedure for so many years.

Using a variety of sources to put together his entries in *Code Names*, Arkin lists over 3,000 code names of sensitive military programs and operations. At the same time, he takes pains not to divulge any information that would cause grave damage to national security or put at risk any individuals associated with the projects. Despite such assurances, a number of senior national security and military officials have not welcomed his revelations with open arms.

Arkin divides this comprehensive book into four parts. Part 1, "Cast of Characters," includes brief descriptions of the main US government departments, agencies, commands, and organizations mentioned in the code-names dictionary. Part 2, "Country-by-Country Directory," highlights US military and intelligence relations worldwide, breaking each country down by US command, agree-

ments, assistance, bases and access, forces deployed, and applicable code names. Part 3, "Code Names Dictionary," is an alphabetical listing of all the names in the book. Part 4 is a combination acronym list and extended glossary.

Despite being a thorn in many backsides, Arkin is qualified to write on the topic. After serving as an intelligence officer in the US Army, he became a recognized defense and intelligence analyst. A prolific writer, he has authored or coauthored 10 books, over 500 articles, and numerous chapters for publications. His best-selling book *Nuclear Battlefields: Global Links in the Arms Race* (Ballinger, 1985), revealed locations of all US and foreign nuclear bases worldwide. Arkin also has served as the senior military adviser to Human Rights Watch and as an adjunct faculty member at Air University's School of Advanced Air and Space Studies.

Who should or who will read this book? Arguably, its exposure of closely controlled programs, missions, and relations make it a must-read for people opposed to US policies, including many of our opponents on the international scene. More than likely, even these individuals won't be able to read this work cover to cover. In essence *Code Names* is a gigantic index, just as the author intended. Dedicated readers, including students of national security policies, will look for specific topics in small doses or cover sections of interest in a measured, incremental approach.

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My Battle of Algiers: A Memoir by Ted Morgan.
Smithsonian Books, imprint of HarperCollins
(<http://www.harpercollins.com/index.aspx>),
10 East 53rd Street, New York, New York 10022,
2006, 304 pages, \$24.95 (hardcover), \$14.95
(softcover) (2007).

As the United States deals with counterinsurgency operations in the global war on terrorism, it becomes vital to study past counterinsurgency operations. The mistakes and innovations of French forces in Algeria as well as the networks and innovations of their archrivals—the Algerian National Liberation Front (FLN)—offer valuable benchmarks in discussing counterinsurgency operations. Sanche de Gramont, now known as Ted Morgan, an American living in New York City, fought this war as a newly minted second lieutenant in the French army from 1956 to 1957. *My Battle of Algiers* offers a realistic look at this conflict and discusses

the efficacy of the use of torture, the importance of maintaining the moral high ground, the erosion of authority through racism, and tactical lessons of this conflict.

Readers will learn that on 8 May 1945, 5,000 Algerians carrying banners asking for Algerian independence were brutally crushed by a French colonial administration attempting to maintain the status quo. Part of the suppression included killing 6,000 Algerians in reprisal for the murder of 21 French settlers. A few of the Algerian officers who saw service in France's colonial wars and in World War II formed a cadre of discontented cells that would create the nucleus of the FLN, which committed atrocities to provoke reactions from French forces. Among their tactics, its members developed a terror campaign of urban bombing in which women, supposedly French, left bombs in cafes in major cities.

Wishing to concentrate on the Algerian insurgency, France granted independence to Tunisia and Morocco in 1956. But these two nations became friendly border states to the FLN. Violence increased, and the French started a call-up of 180,000 conscripts that would become 3 million troops in an eight-year war to suppress the Algerian nationalist movement. At this time, Gramont received a conscription notice in the United States.

Morgan—winner of a Pulitzer prize in journalism—offers keen journalistic insight in his book, discussing how torture for information affects both the terrorist as well as the person inflicting the harm, and addressing both his involvement in brutal acts and the way he psychologically justified what he calls unimaginable barbarities. He also includes an insightful discussion of the FLN tactic of enforcing Islamic morals as a means of controlling neighborhoods in Algiers. Morgan delves deeply into the mechanics of both sides as they respond to each other's tactics, which finally led Charles de Gaulle to grant Algeria independence in 1962. *My Battle of Algiers* is an excellent book for people involved in counterterrorism or civil affairs.

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Corky Meyer's Flight Journal: Dodging Disasters—Just in Time by Corwin H. Meyer. Specialty Press
(<http://www.specialtypress.com>), 39966 Grand
Avenue, North Branch, Minnesota 55056, 2006,
252 pages, \$27.95 (softcover).

Want excitement? Try this scenario: you are flying at 25,000 feet with another aircraft near you.

You see that the other pilot has a glassy-eyed daze and that he is wearing a defective oxygen mask. In 10 minutes, his aircraft will run out of fuel and ditch in the ocean, but you can't communicate with him. What do you do?

Or do you like quick decisions at high speeds? You are a pilot who is testing aircraft dive speed. When you try to pull up, you have no control. As you pull the stick with both hands to increase altitude, the dive angle only increases. At 500 mph, you know you have under 10 seconds to live. What do you do?

If you are looking for exciting pilot stories, read *Corky Meyer's Flight Journal*. The cases above are just two of the many emergencies Meyer faced in his 36-year career with Grumman Aircraft.

This book is autobiographical, but it focuses on technical flight evaluations of aircraft and the history of Grumman Aircraft rather than on Meyer's personal life. Pilots should read this book because the author's stories of surviving many difficult flights could serve as a flight-safety textbook.

When Meyer tells how he survived in-flight emergencies, he has a unique credibility. His long career and the many kinds of aircraft he has flown, from propellers to jets, give him a great store of knowledge and experience.

People who like Meyer's articles in *Flight Journal* and other magazines will enjoy this book, and so will historians and aviation lovers. He includes notes about and comparisons of the best-known World War II aircraft. Some readers may skim over the technical details but will appreciate Meyer's readable tales, flying skill, and the divine intervention he credits with helping him survive test-flight emergencies.

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Uneasy Balance: Civil-Military Relations in Peacetime America since 1783 by Thomas S. Langston. Johns Hopkins University Press (<http://www.press.jhu.edu>), 2715 North Charles Street, Baltimore, Maryland 21218-4363, 2003, 208 pages, \$39.95 (hardcover).

Over time, the relationship between the United States and its military has been extremely varied. The same Army that once threatened to stage a coup in Newburgh, New York, in 1783 is now considered by many to be one of the most trusted institutions in the country. How military and civilian leadership work to reach the same goals, either in

concert or otherwise, is one of the most vital political dialogues going on today.

In *Uneasy Balance*, Thomas Langston provides a structure for analysis by dividing the nation's political and military history and then examining the process by which the United States and its military realigned themselves against different emerging peacetime or wartime threats. Fraught with historical references, the narrative not only orients the reader but also provides the basis for any discussion on policy decisions. Langston's meticulous research pays major dividends, increasing the reader's understanding while adding value to the analysis and conclusions.

In examining wars scattered across the spectrum of conflict, the author points to several important lessons regarding cooperation between those who make policy and those who put that policy into action. Not one to let details slip, Langston also takes note of the interaction between all players in the policy process. The role of the public and the press is always considered in the "civil" part of civil-military relations—something frequently neglected by other analysts.

Of course, *Uneasy Balance* covers the standard points of any examination of civil-military affairs: the Goldwater-Nichols Department of Defense Reorganization Act of 1986, post-Vietnam restructuring, the beginning and end of the military draft, and the end of the Cold War. However, the true value of Langston's work lies in his case studies of earlier, less-scrutinized conflicts, including the Spanish-American War and the Philippine Insurrection.

Although Langston's appraisal of past civil-military alignments is in many ways sound, the conclusions and policy recommendations he includes in the end of the book seem rather idealistic. Such ideas as further reorienting the reserves towards homeland security, increasing preparation for peace operations, and further accommodating American society's intolerance of casualties are attractive but ultimately drastic and, as a result, unworkable. The author acknowledges possible obstacles posed by the Iraq war but does not examine them in detail. However, to his credit, Langston assails utopian assumptions about the changing nature of war and remains firmly grounded in reality. *Uneasy Balance* is a compact, well-researched, and revealing work on how America's military relates to the rest of society.

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Thunder over the Horizon: From V-2 Rockets to Ballistic Missiles by Clayton K. S. Chun. Praeger Security International, imprint of Greenwood Publishing Group (<http://www.greenwood.com/psi>), 88 Post Road West, P.O. Box 5007, Westport, Connecticut 06881-5007, 2006, 240 pages, \$49.95 (hardcover).

At times it's hard to imagine that the Cold War has been over for almost two decades. Although Clayton Chun's book *Thunder over the Horizon* isn't solely committed to the history of the Cold War, it does provide the reader with an introduction to ballistic missiles and their effect on that conflict. The author describes these concerns and the way they have molded not only US foreign policy but also the international policies of nearly all world regimes.

Chun speaks with a high level of credibility, having served as a missile-launch officer and author of several titles relating to military power. He brings his knowledge of ballistic missiles to the reader in a way that makes historical events relevant to current world events. In the first chapter, which includes several photographs and diagrams, Chun introduces the reader to the whos, whats, and hows of ballistic missiles and their operation. Topics include flight phases, liquid motors, solid motors, and guidance systems, and the first chapter's summary deals with problems encountered in building these missiles. The author does not go into difficult engineering detail, and most readers will be relieved to know that he uses no mathematical equations to describe any aspect of his subject, instead choosing to give the reader a fundamental knowledge of ballistic missiles.

Proceeding from these basics, Chun takes the reader on a journey through the history of these weapons, starting with the German V-2 in World War II, noting the difficulties in both building and defending against it. The major construction problems the Germans experienced—mainly propulsion and guidance—are the same ones countries face today. Even though the Allies did not consider the V-2 a very accurate weapon, they nevertheless had to deal with the threat it posed, throwing considerable resources against the manufacturing, assembly, and launch sites that supported the missile—resources they could have used elsewhere.

The book also offers a history of the Cold War between the United States and Soviet Union, again addressing the difficulty of building and defending against ballistic missiles and relating how

the United States put together its force of nuclear ballistic missiles, starting with the Thor and Jupiter systems shortly after the launch of *Sputnik 1/II* by the Soviet Union in 1957. By this time, the Eisenhower administration, feeling that the United States had fallen far behind the Soviet Union in ballistic-missile design and production, triggered the race to build bigger, faster, and better missiles than the Soviets. This jump in missile technology directly supported the manned space program of the 1960s.

A chapter on the Cuban missile crisis not only recounts the events of that crisis but also describes some of the chess-like policy decisions made by the United States, Soviet Union, and Cuba, with the possession of ballistic missiles representing the key piece to winning or losing the game. In another chapter, Chun writes about the war between Iran and Iraq and each country's attempt to modify existing missiles in order to gain the upper hand. By the end of the war, the ballistic missile had not necessarily become what both countries wanted—an accurate weapon capable of destroying distant targets. The author points out one key concern that has persisted since the Germans' development of the V-2: that without proper guidance and propulsion, the ballistic missile becomes a terror weapon difficult to defend against and difficult to make accurate.

A chapter on proliferation that describes current ballistic-missile ownership and capability is not just a simple laundry list but includes a brief history of each nation and its rationale for acquiring such capability. The following chapter, on national strategy and policy, covers our interaction with these countries and how their ownership of missiles affects those relationships. Chun concludes the book with a chapter on technology and the part it has played in shaping our history, noting the rivalry between air-delivered weapons and ballistic missiles during the era of Strategic Air Command.

I recommend *Thunder over the Horizon* to anyone interested in either learning about ballistic missiles or expanding his or her knowledge of these weapons. Even though the Cold War is over, these missiles still play an important part in world politics, especially in light of the current situation in both Iran and North Korea.

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Left to right: Lt Col Paul D. Berg, USAF, chief of professional journals; Lt Col Luis F. Fuentes, USAF, retired, editor of *Air and Space Power Journal – Español*; and Maj Gen Pedro R. Peña, chief of staff, Fuerza Aérea Dominicana (Dominican Republic Air Force) (6 August 2008, Santo Domingo, Dominican Republic). General Peña was subsequently promoted to the rank of lieutenant general and named secretary of the armed forces.



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