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On Space-Power Separatism

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IN SEPTEMBER 1997, Gen Charles A. Horner, USAF, Retired, commander of coalition air forces during Operation Desert Storm and later head of Air Force Space Command and US Space Command (CINCSPACE), created something of a stir when he questioned whether the US Air Force should continue to run military space systems: "If the Air Force clings to its ownership of space, then tradeoffs will be made between air and space, when in fact the tradeoff should be made elsewhere."[1]

Although General Horner made his assertion based on budgetary considerations, his remarks encouraged Air Force officers who, using the original leaders of the US Air Force as role models, argue for a separate "space service." Spacepower enthusiasts see themselves as modern counterparts to the early airpower visionaries and often draw parallels between the rise of airpower and the rise of space power. Both originated in a desire to occupy the "high ground" and maintain a commanding perspective of the surface battlefield. Air-to-air and air-to-surface combat arose and flourished in the flames of two world wars, leading eventually to the creation of independent air forces as air officers sought to set free a new and potentially decisive arm of military force from surface-warfare paradigms.[2]

If, as Billy Mitchell said, "airpower is the ability to do something in the air," then one can say that *space power is the ability to do something in space*. Unfortunately, over 40 years after the first satellite orbited the Earth, we still cannot operate in space nearly as easily or routinely as air forces could operate within a decade of the Wright brothers' first flight.

Space power has not yet progressed much beyond that first parallel stage of development. Most people assume, however, that warfare in and from space will eventually become a reality.[3] Although space weaponization is hardly a foregone conclusion,[4] the weapons and concepts of operations to make it happen have been in development for some time. Fancying themselves as modern-day Mitchells or Giulio Douhets, space-power separatists maintain that space forces will reach their full military potential only when they free themselves from airpower paradigms.

A United States Space Force?

No explicit agreement exists on a specific boundary between air and space. The altitudes at which the effects of lift and drag become negligible, or at which a cabin or suit must have an independent supply of oxygen and pressure, or at which turbojet engines become inoperable all differ. In international law, the major space powers generally accept "the lowest perigee attained by orbiting space vehicles as the present lower boundary of outer space," but this standard is not universal.[5] Even if a more precise delineation between the two environments proves impossible, their physical differences remain significant. The space environment is largely a vacuum characterized by high-energy particles, fluctuating magnetic fields, and the presence of meteoroids and micrometeoroids. The motion of bodies in orbit closely follows the laws of celestial mechanics, a much different system of knowledge than the laws of aerodynamics governing the flight of aircraft. Aircraft operate in the much more benign environment of Earth's atmosphere, characterized by moisture, wind, precipitation, and pressure.

In perhaps the most persuasive argument for a separate space service, Lt Col Bruce M. DeBlois analyzes the two different environments and extrapolates a comparison of the relative advantages of airpower and space power (table 1).[6] Based on his analysis, DeBlois concludes that "one cannot build space power theory and doctrine in general upon airpower theory and doctrine. Theories and doctrines of airpower, land power, and sea power may contribute significantly to the development of the theory and doctrine of space power, but space power clearly requires fundamental, bottom-up, theoretical and doctrinal development. The most conducive requirement for such development remains a separate space corps or service."[7]

In the past, Air Force doctrine has challenged the notion that physical differences between air and space necessarily require a separate space service:

> Some people have seized on the differences in air and space technologies to argue that space constitutes a separate environment from the air and that space requires development of a separate force to exploit it just as the land, sea, and air environments require separate forces. This argument is equivalent to saying that submarines and surface ships should be in separate force structures. Although there are many differences between submarine and surface craft, the important quality they share is that they both operate at sea. Infantry and armor use quite different technologies as well, but they do not require separate services because their significant unifying characteristic is that they both operate on land. Similarly, the important quality that air and spacecraft share is that they operate above the earth's surface. Moreover, no sharp boundary exists between air and space, while it is quite obvious when one moves from land to sea or from aerospace to land or sea. . . .
>
> Freedom of movement and speed underscores *[sic]* the military usefulness of exploiting air and space. While no current platform has the ability to completely exploit the full spectrum of the aerospace environment, the planned devel- opment of an aerospace plane to operate both in the atmosphere and in space serves to illustrate the continuity of aerospace. Its continuity is further evidenced by the fact that conceptually many of the same military activities can be performed in air and space, even though different platforms (some of which are yet to be developed) and somewhat different methods must be used to perform them. Thus, from a military, as opposed to an engineering, perspective, the aerospace

Table 1

Characteristic Advantages of Airpower and Space Power

	Airpower	**Space Power**
Politics	Political access to the realm [military use of space is limited by particular political and legal constraints]	Sovereignty [no overflight restrictions in space; international agreements support free access] Likelihood of reduced casualties [based on use of remote, unmanned systems]
Development/ Employment	Centralized command and control (C^2) [centralized C^2 for space is degraded by multiple organizations intruding upon CINCSPACE's on-orbit control, launch, acquisition, research and development (R&D), and budget authority; airpower not comparatively constrained] Decentralized execution [concept applies relatively more to airpower; controlling and executing elements for space may, in effect, be the same]	[No comparative advantage for space power]
Realm Access	Access to the realm (operations) [ease of performing operations in the air as opposed to space] Access to the realm (maintenance/support) [ease of performing maintenance/ support for air operations as opposed to space operations]	[No comparative advantage for space power]
Realm Environment	Composition of the realm [hostile nature of the physical space environment as opposed to the air environment]	Size of the realm [space affords unlimited potential for freedom of movement] Position of the realm [space environment encloses the air environment]
Realm-Afforded Capability	Autonomy [advantage of independent decision-making capability in manned versus unmanned systems] Maneuver [aerodynamics versus orbital mechanics] Flexibility Precision Firepower Stealth	Surveillance and reconnaissance [advantages of perspective and elevation] Duration Range Speed of response

Source: Adapted from Col Phillip S. Meilinger, ed., *The Paths of Heaven: The Evolution of Airpower Theory* (Maxwell AFB, Ala.: Air University Press, 1997), 564.

Where is today's [Billy] Mitchell . . . for space power?

environment must be considered as an indivisible whole.[8]

DeBlois asserts, however, that *"the aerospace conjecture is false"* (emphasis in original).[9] Although he concedes that there is "potential for some technological mitigation of the vast differences in the characteristics of airpower and space power," he dismisses programs such as the space plane on the grounds that, historically, "dual-environment vehicles have proved more expensive and less capable than separate vehicles designed especially for each environment."[10] Although this observation may be valid, as a casual rejection, it is certainly premature.

Regardless, as do many space-power advocates over the years, DeBlois criticizes a perceived tendency to derive space doctrine simply by substituting the term *space* (or *aerospace*) in airpower doctrine. He rejects the argument that airpower and space power should be merged, based on their functional equivalence in "employing military power from the third dimension." He counters that this logic wrongly dictates merging land and sea power based on the same functional equivalence (employing military power from the two-dimensional surface): "Despite the existence of a functional equivalence between two forms of military power . . . and the existence of the technical means to accomplish those functions, the fact remains that the environment and the technological means that posture us in those environments remain different. This is true of land and sea power; the examination of characteristics indicates that it is also true of airpower and space power."[11]

Two Hypotheses

One cannot dispute the fact that the air and space environments, as well as the technological means that allow us to operate in those environments, are different. However, the fact that the differences necessarily dictate a space force (or space *corps*) separate from the Air Force is not as obvious.

From a practical viewpoint, to assert that *because a unique environment requires a unique expertise, an independent space force is required* demands that one prove at least one of the following hypotheses (preferably both):

1. The requirements for that unique expertise are not being fulfilled within the current framework of organization, *or* the resources of that expertise are not being used properly.
2. Only an *independent* space force can provide a capability that is considered vital to our national defense.

In effect, proving the first hypothesis means proving that the United States Air Force has not served as a satisfactory steward for our nation's military space power. Undoubtedly, some people, both in and out of the Air Force, would make such an assertion—but the evidence suggests otherwise. Certainly, as with air, many civil, commercial, and military organizations remain involved in and committed to space, including the Army and Navy. However, the Air Force owns and operates the *preponderance* of *military* space assets. As Gen Robert T. Herres, former CINCSPACE, has written, "Since the 1950s the Air Force has continued to fund, research, and develop those military systems designed to exploit the full medium encompassing all of aerospace. The Air Force has accumulated a wealth of experience in space operations and accumulated it at a great price. It is incorrect to think those investments have been made and are being made without a full appreciation of the force structure that must be provided for air and space operations."[12]

Some people may disagree with the general's last assertion. Certainly, many Air Force officers today do not have full cognizance of the value and importance of space power. At the same time, one should admit that not all Air Force officers have full cognizance of the value and importance of *airpower!* Too many Air Force officers think that understanding and appreciating basic and operational-level aerospace doctrine is somebody else's problem, not theirs.

Nevertheless, today and for the foreseeable future, the United States in general (and the

Air Force in particular) remains the world's preeminent military space power. In the Persian Gulf War, Air Force Space Command assets proved critical enablers to the conduct of combat operations by all of the services—but particularly by coalition air forces, which shouldered most of the war-fighting burden during the thousand-hour-war air campaign. Since then, several new types of precision-guided munitions that use space-based navigation for guidance have entered (or will be entering) the Air Force inventory, including the AGM-130, the Joint Direct Attack Munition, and the AGM-154A Joint Standoff Weapon. Such weapons and space-based capabilities provide the foundation for the Air Force core competency of "precision engagement."

So, where is today's Douhet or Mitchell (or even Alfred Thayer Mahan) for space power? So far, no such original thinker has yet clearly emerged.

In fact, space-power considerations are so intertwined with *all* Air Force core competencies that, without these inherent space capabilities, the Air Force's core-competency promises become almost meaningless. Space power, together with the information-superiority and precision-engagement capabilities provided thereby, enables airpower finally to approach the full level of its potential as envisioned by Mitchell, Douhet, and other early airpower theorists. The air and space mediums *are* different, but *air and space forces, operating together, offer a unique and potentially decisive synergistic effect from the third dimension*.

Space-power separatists may maintain that a separate service (or corps) could better address vulnerabilities that exist in our space capability or better exploit technological capabilities to field currently nonexistent systems. This was the implication of General Horner's statement, and—to an extent—the point is valid: in funding aerospace forces, one *should* make choices somewhere other than between air and space. All the services enjoy the benefits of space-based capabilities, but the Air Force bears most of the funding burden for very expensive space assets. Currently, the defense budget is roughly split three ways (among land, sea, and aerospace power). If creating a separate space force would allow the budget to be split *four* ways, thus allowing air and space forces to command *half* of US defense outlays, the attraction for aerospace power advocates becomes obvious. In reality, such an arrangement likely would not make a significant difference when one considers diminished budget resources, the power of the established services to retain their share of the pie, the additional overhead costs in creating and maintaining a separate space service, and the very real questions regarding the nation's political will to militarize space even further. For example, one cannot blame Air Force doctrine or leadership for the fact that the Clinton administration, without consulting the Air Force (and in apparent contravention of its own space-transportation policy), used the line-item veto in 1997 to strike out Air Force funds for testing a military space plane.[13]

Thus, based on the current state of our military space forces and the attention those assets receive within today's Air Force organization, I argue that the first hypothesis remains *unproven*. The second hypothesis now becomes even more important.

Space-power separatists inherited the pioneering and rebellious spirit that spawned the independent United States Air Force. At first blush, it appears natural that space power should remain separate from airpower, just as airpower should remain separate from surface power. But something is missing. Early airpower advocates offered a compelling rationale for an independent air force, based on reasons other than the differences in physical environment. Mitchell, Douhet, Hugh Trenchard, and many others argued instead for the *decisive and revolutionary impact that independent airpower would have on the conduct of warfare*. They articulated a comprehensive vi-

sion showing that an independent air force could do things for national defense that an air force corralled within the organizational framework of the Army and Navy could *not* do. In some cases, these early advocates were way ahead of their time. Prophecies regarding capabilities of airpower once thought discredited now receive new emphasis.

The real crux of the matter for airpower separatists in the early years was the prevailing view of surface officers that air forces *must* remain ancillary to surface forces. Although some antagonism exists within the Air Force (certainly not confined to Space Command) with regard to the flying community's domination of today's service leadership, one wonders whether the current situation really parallels the fundamental philosophical disagreements between air and surface officers earlier in this century. According to General Herres,

> Space Operations were seen as a natural outgrowth and extension of air operations. As early as the 1950s, Gen Thomas L. White coined the word *aerospace* to describe the medium for Air Force operations. Since then we have considered "air" and "space," while two separate entities, as constituting a single realm—an "operationally indivisible medium." Even before the Soviets launched Sputnik, the senior leadership of the Air Force was looking ahead to a role for the Air Force in space. Clearly this is quite different from the view the Army took toward aviation in those earlier years when General Mitchell and others argued for a distinct role for air power. The Army of General Mitchell's era rejected a large role for aviation; the Air Force of today eagerly awaits the growth of space activities as part and parcel of aerospace.[14]

So, where is today's Douhet or Mitchell (or even Alfred Thayer Mahan) for space power? So far, no such original thinker has yet clearly emerged. Without one, an independent space force really seems to lack a raison d'être. Arguing that one needs a separate space service to fulfill the potential of military space forces without elaborating a realistic vision of what that potential is (and *why* it requires an independent space force) is like putting the cart before the horse. One finds much theoretical discussion on the "how" of space warfare but, other than the paradigm of independent airpower theory (or the futuristic musings of science fiction), not much on the "why." One also finds only vague generalities of the need to "take the high ground" to gather information and apply precision force globally. (Interestingly, as should be clear, this is what aerospace power already does today.)

Let us return for a moment to the question of *decisive* force. One need only look to history for scenarios involving the decisiveness of land power, sea power, and airpower in warfare. The dictionary definition of *decisive*—"having the power to decide"—is not very precise. In a joint war-fighting context, the term can easily cover a range of possibilities, including an eclectic "me-tooism," in which everyone claims a "decisive" role. Thus, one can reasonably say that space-based force enhancement proved decisive in the Persian Gulf War—much as one can argue that airpower (in a reconnaissance role) proved decisive in the Battle of the Marne in 1914. The definition can also include another extreme whereby a single service declares itself the sole factor of victory in war—an interpretation that provides fertile ground for bitter interservice rivalry. One should keep in mind Douhet's admonition that "there is a vast difference between 'the sole factor of victory' and 'the decisive factor of victory.' "[15]

The point of this discussion is that the current lack of a full range of force-application capabilities directly from space to Earth becomes an important consideration in the debate over space-power separatism.[16] Until humans migrate from Earth, warfare will still be about achieving objectives within the terrestrial environment (land, sea, and air). This means that without a viable space-to-surface force-application capability, space power (independent or otherwise) in and of itself cannot be decisive in warfare except under the broadest possible interpretation that includes Space Command's outstanding force-enhancement capabilities. The latter definition implies a subordination to airpower, land

power, and/or sea power, which would place an independent space force in a uniquely inferior position by way of the other established services. By necessity, future war fighting will be joint. But all of the independent services are organized, trained, and equipped to fight and win the nation's wars—preferably together, alone if absolutely necessary. Space power by itself cannot currently do that.

At least for now, the case for an independent space force remains unsubstantiated.

If, however, space-based force-application capability becomes a reality, many terrestrially based military systems will probably become obsolete. For example, a recent article in US Naval Institute *Proceedings* argues that weapons in low Earth orbit would present such a threat to seaborne forces that the modern carrier battle group—the centerpiece of current US naval strategy—might become extinct.[17] Moreover, because any space-based force application into the terrestrial environment must (in a unique fashion) transit the atmosphere, the eventual implications for airpower are profound.

If space-based force application approaches the full potential of its technological capabilities (i.e., the ability to find, fix, track, and destroy virtually anything in the terrestrial environment), the debate over a separate space service will become obsolete because airpower, as we understand it today, will become obsolete. Space power will be able to do virtually everything that airpower does today—and do it faster with less risk. Predominantly space forces (with air in an auxiliary role) will subsume the roles and missions of air forces, and the reins of power within the US aerospace force will, by rights, transfer from the combat pilot of today to the space operator of tomorrow. Because we are already an aerospace force, the transition should be a smooth one—perhaps imperceptible. (Conversely, if the Air Force flying community successfully resists such a necessary transition, the need for an independent space force will become clear.)

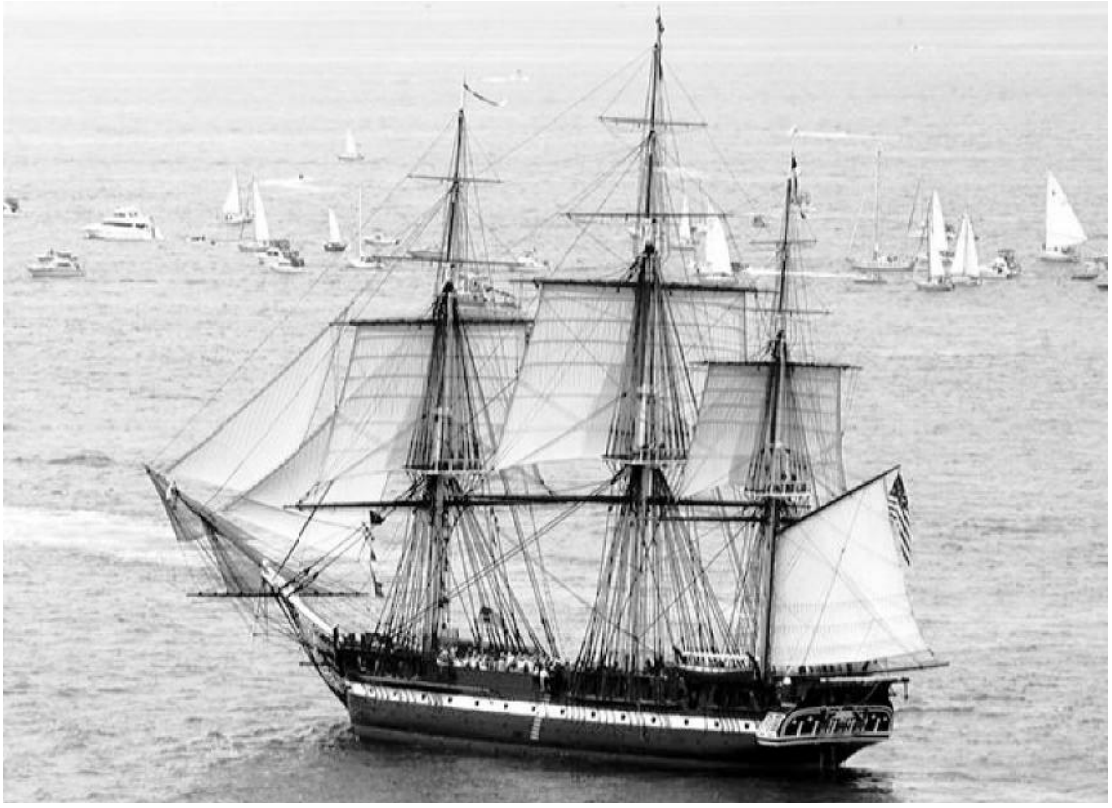
In this future aerospace force, the practical war-fighting dimensions of the air and space environment will become fully unified. Moreover, in this context, space-based force application can effectively implement its role and mission by capitalizing on the expertise (particularly in intelligence, targeting, battle-damage assessment, etc.) already resident within the Air Force, rather than replicating those capabilities within the framework of a separate organization.

Thus, I argue that the second hypothesis, like the first, is *unproven*. At least for now, the case for an independent space force remains unsubstantiated.

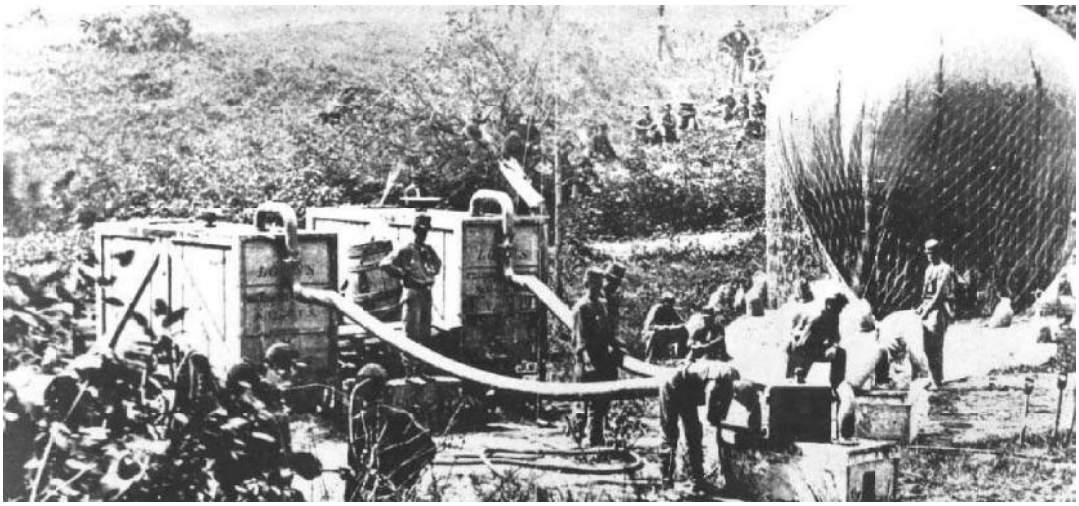
The Tasks at Hand

To say that the current rationale for an independent space force is hollow is not the same thing as saying that there are no issues to resolve before today's Air Force can become a fully capable aerospace force. In doctrine, the Air Force must come squarely to grips with a broad issue: the theater requirements of a joint force commander (and his or her component commanders) versus the global focus of space forces (in terms of retaining unity of command of aerospace forces). Newly approved Air Force Doctrine Document (AFDD) 2, *Organization and Employment of Aerospace Power,* presents images of unified air and space organization and employment but leaves many questions unanswered. The practical understanding of how we will fight the next war remains unclear. The Air Force is actively exploring a number of options for marrying vision to reality, including fleshing out notional supported/supporting relationships and concepts that implement "reachback." Proposals that integrate formal space expertise into other Air Force major commands and numbered air forces are being studied.

One answer entails centralizing the tasking of military space forces at the unified level



Although the need or desire to exploit a new medium has resulted in separatism, the pace has been set by the development of technology and doctrine. Are time lines for sea power (centuries) or airpower (decades) relevant?



(i.e., US Space Command) so that service components would receive all wartime tasking from CINCSPACE.[18] In effect, this means the creation—in function if not name—of a joint force space component commander, probably CINCSPACE, directly supporting a theater commander. Although this option may seem attractive on the surface, it directly undercuts the integrated aerospace concept (and thus strengthens the argument for a separate space force). It also sets the stage for significant coordination problems between air and space (as space war-fighting capabilities mature) that parallel today's coordination problems between air and surface forces.

Alternatively, one might designate the joint force air component commander as the *supported* commander for space operations within a given theater. (In the absence of functional component commanders, the supported commander for space operations would be the commander of Air Force forces.) Establishing direct liaison authority between the service components of US Space Command—operating in mutual support—and the joint force air component commander[19] would make the latter the single point of contact for operational-level space concerns for a joint force commander. It would also prevent the division of aerospace forces for employment and would avoid the insertion (except when absolutely necessary) of an extra staff layer (i.e., at US Space Command) in the tasking process—thus expediting space support to the war fighter. Currently, no approved joint doctrine on space addresses this issue,[20] but the latter approach is consistent with current Air Force and joint C^2 doctrine as well as long-standing doctrinal tenets on the C^2 of airpower.

The good news on the doctrine front is the recent publication not only of AFDD 2 but also of AFDD 1, *Air Force Basic Doctrine,* as well as AFDD 2-2, *Space Operations.* Both AFDD 1 and 2-2 go to great lengths to present a united view of aerospace power;[21] they also show the degree to which the facets of that power are not characteristically or inherently limited to air-breathing platforms. Inevitably, as people digest these and other follow-on doctrine publications, one will probably hear charges that Air Force doctrine has not changed enough— or is not forward thinking enough—with regard to space operations. However, to say that a separate space force is justified in order to create space doctrine is backwards. One must base the creation of a separate space force on sound concepts and doctrine *first*.[22]

Generally, doctrine comes from three sources: actual wartime experience, theory, and war games/exercises. Deriving new doctrine from wartime experience can prove painful since armed forces tend to learn their most meaningful doctrinal lessons only in defeat. The debacle at Kasserine Pass in 1943 is a poignant example of wartime experience teaching American forces the value of proper C^2 of airpower. Conversely, victors tend to refight the "last war," often with unfortunate consequences. The French military experience of 1940 is probably the best modern illustration of this danger. French doctrine, featuring an infantry-dominated linear strategy reminiscent of World War I, fell prey to the innovative, mechanized blitzkrieg doctrine of the Germans. Obviously, for the purposes of our discussion, we have little wartime experience to draw on in the creation of unique space war-fighting doctrine.

Deriving doctrine solely from theory is also undesirable because it means adopting strategies without any empirical evidence that they will prove successful or even necessary. The disastrous French infantry charges early in World War I, mandated by doctrine derived from the theoretical power of élan, provides an example of the danger of inferring doctrine in the abstract. Most notional, doctrinal ideas about space war fighting are based on theory. Without actual war-fighting experience, theory serves as a logical and necessary first step, but one should not regard the results as conclusive.

Because war games and exercises based on realistic models and simulations can provide empirical evidence for what works and doesn't work in doctrine without putting lives at risk, they represent the best option for turning theory into doctrine. Space has received much at-

tention in recent war-game play among the services and other agencies. People continue to consider and debate the doctrinal implications of these games. The US Army, in particular, has made space an extraordinary focus of emphasis in its "Army after Next" war-game series.

Even if some of the conclusions drawn from these games should be obvious axioms to advocates of aerospace power,[23] the Air Force, as the custodian of the nation's military-space experience and expertise, should seize and hold the lead in the creation and implementation of military-space strategy in the joint environment. To do that, we should collectively embrace our identity as a US *Aerospace* Force, in both name and function, sooner rather than later. □

Notes

1. "Air Force Space System Control Questioned," *Space News,* 8 September 1997, 2.

2. Amazingly, one still hears arguments about whether or not the Air Force has "proved" itself as a separate service. For example, James F. Dunnigan writes, "Currently, the marine ground commanders have the advantage their army counterparts had until the air force became a separate service: complete control over air support for the ground troops. Merging the army and air force would give soldiers that same edge once more. . . . It's time to admit that we made a mistake creating a third service." *Digital Soldiers* (New York: Saint Martin's Press, 1996), 294–96.

3. For example, in a published interview, Gen Joseph W. Ashy, retired commander of Air Force Space Command and US Space Command, said that "the United States will—and I'm not trying to promote war here, I'm just saying that's what humankind is like—eventually fight from space and into space" when it becomes imperative to protect US assets. "A. F. Space Chief Calls War in Space Inevitable," *Space News,* 12 August 1996.

4. For an outstanding review of the arguments against the weaponization of space, see Maj David W. Ziegler, *Safe Heavens: Military Strategy and Space Sanctuary Thought* (Maxwell AFB, Ala.: Air University Press, June 1998).

5. Maj Michael J. Muolo, *Space Handbook: An Analyst's Guide to Space,* vol. 2 (Maxwell AFB, Ala.: Air University Press, December 1993), 4–5.

6. Maj Bruce M. DeBlois, "Ascendant Realms: Characteristics of Airpower and Space Power," in *The Paths of Heaven: The Evolution of Airpower Theory,* ed. Col Phillip S. Meilinger (Maxwell AFB, Ala.: Air University Press, 1997), 529–78.

7. Ibid., 564–65.

8. "Essay H: Aerospace Environment," in Air Force Manual (AFM) 1-1, *Basic Aerospace Doctrine of the United States Air Force,* vol. 2, March 1992, 67. Air Force Doctrine Document (AFDD) 1, *Air Force Basic Doctrine,* the most recent example (September 1997) of basic doctrine, does not directly address the conflicting notions of air versus space but implicitly treats the two as a unified whole from a doctrinal point of view.

9. DeBlois, 564.

10. Ibid., 564, 566.

11. Ibid., 565.

12. Gen Robert T. Herres, "The Future of Military Space Forces," *Air University Review* 38, no. 2 (January–March 1987): 43.

13. "A Shortsighted Veto," *Space News,* 8 September 1997, 12.

14. Herres, 42. General Herres also presents a good argument as to why a separate space service does not make sense in terms of the how and why of current Department of Defense organization and structure. Although I have not addressed this here, his points remain valid and worth reading.

15. Giulio Douhet, *Command of the Air,* trans. Dino Ferrari (1942; new imprint, Washington, D.C.: Office of Air Force History, 1983), 258.

16. One can legitimately define ICBMs as space weapons (our current ICBM force now resides in "space wings"). However, one can safely dismiss as 40 years too late any argument that ICBM force application constitutes a revolution in modern warfare requiring an independent space force.

17. Kenneth Roy, "Ship Killers from Low Earth Orbit," US Naval Institute *Proceedings,* October 1997, 40–43.

18. This is the option presented in Headquarters US Space Command/J330, "Concept of Operations for Command and Control of Space Forces," draft, 24 April 1998.

19. This is the option presented in Fourteenth Air Force, White Paper on the Command and Control of AFSPACE Forces, 20 April 1998.

20. As of this writing, release of a preliminary coordination draft of Joint Publication 3-14, *Space Operations,* is still pending.

21. Sensibly, the Air Force is jettisoning the unintentionally divisive "air and space" construct in favor (once again) of *aerospace.* Using the term *aerospace* does not mean pretending that no boundary exists between air and space. As Lt Col Frank Jennings, USAFR, Retired, one of the originators of the term, wrote, "Whoever in the Air Force is proclaiming that satellites are much like airplanes, or that no boundary separates air from space, not only does not understand aerospace doctrine but has strayed far from the concept explained and expounded by Gen Thomas White and many others since the 1960s." "Doctrinal Conflict over the Word *Aerospace,*" *Airpower Journal* 4, no. 3 (Fall 1990): 50–51.

22. One should note that mature airpower doctrine preceded the creation of an independent Air Force. In July 1943, for instance, the US Army introduced Field Manual (FM) 100-20, *Command and Employment of Air Power,* which made the following assertions: "Land power and air power are co-equal and interdependent forces. . . . The inherent flexibility of air power is its greatest asset. . . . Control of available air power must be centralized and command must be exercised through the air force commander if this inherent flexibility and ability to deliver a decisive blow are to be fully exploited" (pages 1–2). Such tenets remain a crucial part of US Air Force doctrine.

23. For example, a preliminary conclusion drawn from the "Army after Next" Space Game Two exercise held in Colorado Springs was that "synchronizing satellite and terrestrial operations is difficult because no matter how fast things unfold on the ground, *space systems will have an impact on a given area sooner"* (emphasis added). "Antisatellite Weapons Factor in Simulation," *Space News,* 9 February 1998, 4.