



Airpower for Great Power Competition

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Introduction

The term *great power competition* is increasingly being used to describe the current global strategic landscape facing the United States and its allies. This paper examines the implications of that landscape for airpower. Our adversaries are making aggressive efforts to outpace U.S. capabilities, negate traditional warfighting advantages, gain strategic advantage and influence, and limit the options of the U.S. and its allies through a combination of ways and means. Rapidly evolving challenges to the Joint Force include:

- Rapid diffusion of advanced technologies that can render any technical advantage transitory and fleeting. These include pervasive intelligence, surveillance, and reconnaissance (ISR) enabling faster kill chains, long-range ballistic/cruise missiles, loitering drones for surveillance or strike, cyberspace and anti-satellite weapons.
- Attempts to restrict freedom of maneuver in the global commons.
- Contests for influence and access in terms of access, basing, and overflight.
- Aggressive use subversion, coercion, disinformation, propaganda, and deception.
- A homeland that is increasingly vulnerable to a wide range of kinetic and non-kinetic attacks.

Adversaries simultaneously seek to “win without fighting” while building military forces that can strengthen their ability to prevail in armed conflict against the United States.^[1] As a result, the Air Force can no longer focus on the efficient execution of operations in a predictable strategic environment. They compel the Air Force to refocus its approach to readiness, power projection, human capital development, and capability development to meet the challenges of a dynamic and unpredictable strategic environment.^[2]

This paper explores the role of airpower in great power competition with an eye towards how it can be used to build military advantage for the Joint Force. It frames the elements of military advantage that airpower can be used to create and exploit across the continuum of cooperation,

competition, and conflict. It then examines the capabilities and skills that Airmen will need to create that advantage, thrive, and succeed in the face of rapidly evolving threats.

Framing Great Power Competition

To orient the DoD's approach to emergent challenges, the 2022 National Defense Strategy (NDS) places renewed emphasis on integrated deterrence, campaigning, and actions that build enduring advantages.[3] Those enduring advantages are intended to sharpen by the Joint Force's technological edge by leveraging the DoD itself, the defense industrial base, and the wide array of supporting private sector and academic enterprises. The U.S. will disrupt competitor warfighting advantages while reinforcing those of the Joint Force, as well as enhancing interoperability and access. Nesting underneath the NDS and the National Military Strategy, the Joint Warfighting Concept (JWC) provides a roadmap to the future for addressing their imperatives, challenging the Joint Force to rethink competition, deterrence, and conflict.[4] It presents a fundamental shift in how the Joint Force should think about maneuvering through space and time in fast-paced, rapidly changing, and challenging operating environments.[5]

To further amplify foundational concepts for competition, the Joint Concept for Competing[6] (JCC) defines *strategic competition* as a "persistent and long-term struggle that occurs between two or more adversaries seeking to pursue incompatible interests without necessarily engaging in armed conflict with each other." Updated Joint doctrine places competition within an overall framework of campaigns and operations.[7] The Joint Force requires a mindset to view strategic competition as a complex and ongoing set of interactions in which it contributes to broader U.S. government efforts to gain influence, advantage, and leverage over other actors and ultimately to achieve favorable strategic outcomes. The JCC calls for the application of military power to protect and advance U.S. national interests (including defending the homeland) in order to:

- Deter aggression
- Prepare for armed conflict if deterrence and competition fail to protect vital U.S national interests
- Counter adversaries' competitive strategies that threaten U.S. national interests
- Support the efforts of interorganizational partners

The JCC and JP 3-0 establish strategic competition as an enduring condition to be managed, not a problem to be solved. Great powers have the resources to field advanced military technologies that increase the tempo, range, precision, and destructive capacity of military operations. Once achieved, however, relative technological advantages are fleeting, since a great power has the resources to rapidly mimic or counter a rival's advantage.[8] Strategic competition, whether in relation to great powers or not, is thus an *infinite game*[9] [10] with no clear end point; it is a never-ending contest to develop, maintain, and effectively exploit advantage. The constituent elements of that advantage will change over time as materiel and non-materiel enablers come and go.

The Application of Air Power

In response to the imperatives of the NDS, JWC, JCC, and other guidance, the Air Force has developed a wide range of new concepts and doctrine to articulate how it will execute its core functions^[11] in this competitive strategic environment. These include:

- The **Air Force Future Operating Concept** (AFFOC)^[12], which establishes six key “fights” in which Airmen must be able to prevail in the defense of Allies, partners, and national interests. Airmen will win these fights through the application of *pulsed airpower*, which is the concentrating of airpower in time and space to create windows of opportunity for the rest of the Joint/combined force. If a typical pulse is analogous to a steady and predictable heartbeat, airpower pulses must have an “arrhythmia” that the Joint Force knows but an adversary cannot predict.^[13]
- Doctrine for **joint all-domain operations** (JADO)^[14], which addresses how airpower creates synchronized effects in all domains in coordination with the Joint Force through operations conducted in, from, and through the air domain, the electromagnetic spectrum (EMS), and the information environment.
- Concepts and doctrine for **agile combat employment** (ACE), which is a way of operating that relies less on large traditional main overseas bases as hubs for projecting combat power and more on launching, recovering, and maintaining aircraft from dispersed forward operating locations in concert with allies and partners.^[15] ACE shifts operations from centralized physical infrastructures to a network of smaller, dispersed locations that can complicate adversary planning, improve resilience, and provide more options for Joint Force commanders. Integration with allies and partners is a key aspect of ACE.^[16]
- Revised doctrine on the role of **information in operations**,^[17] which can support the creation of enduring strategic outcomes from joint force tactical and operational successes. All Air Force actions, including words, imagery, and videos, have informational aspects that communicate some message or intent that can be leveraged to support the achievement of joint force objectives. Shaping and leveraging those messages are integral to operations and planning.^[18]
- Doctrine for **mission command**,^[19] a leadership philosophy that empowers subordinate decision-making for flexibility, initiative, and responsiveness in the accomplishment of commander’s intent. Its intent is to provide Airmen operating in environments of high uncertainty, complexity, and change with the freedom of action needed to exploit rapidly developing opportunities and succeed.
- Organizing constructs for **air task forces**^[20] (ATFs) and **combat wings**,^[21] which will change force packaging for theater or global requirements.
- Emergent thinking articulated by the Chief of Staff of the Air Force on **collective agility**,^[22] in which every member of a fighting coalition is synchronized, acting and reacting in concert.

With these efforts and others, a question remains on how to leverage them in an integrated manner to build and maintain enduring military advantage, even as constituent materiel and non-materiel elements change over time; that is, how do we use these tools to deter aggression,

prepare for armed conflict, counter adversary strategies, and support interorganizational efforts? How can airpower's intrinsic reach, lethality, and agility be used to gain influence, advantage, and leverage with strategic competitors?

A useful way to unpack these questions is to first characterize what military advantage is in the first place. While it generally relates to having an edge over an adversary, it can be expressed more concretely in terms of:[23]

- **Geography:** Security through distance has long been a source of military advantage,[24] though it is challenged in an age of long-range missiles, cyberspace operations, space operations, and operations in the information environment. However, physical terrain is the critical resource for projecting and sustaining combat power.
- **Mass:** Creating overmatch through a larger force than an adversary has long been one source of military edge. That may be for the capacity to concentrate forces and achieve local overmatch at the tactical level, or to provide the requisite scale to operate across different parts of the globe. It is not just a question of the size of a nation's forces, but also includes the ability to mobilize and leverage the industrial base and associated supply chains.[25] Emerging approaches to creating different forms of mass than conventional large forces include additive manufacturing, large-scale use of low-cost autonomous systems, and the use of the information environment to shape perceptions and behaviors.
- **Time:** Expanding the time available for joint/combined force decision-making and using it effectively while denying it to an adversary is a key art of military command. At the tactical or operational level, this may entail deceiving adversaries to create more time to prepare and execute operations. At the strategic level, it may relate to selective disclosure[26] (also known as reveal/conceal) of emergent capabilities to alter adversary understanding in beneficial ways. Concealing information about new capabilities or methods can delay an adversary's understanding of them, while deliberately revealing carefully shaped information may be used to provoke a specific desired response. Understanding and controlling tempo (the relative speed and rhythm of operations relative to an adversary) is critical, not just within a single operation but in sequencing between them in a campaign. If strategic competition is a long game, managing time effectively is vital.
- **Technology:** Securing a competitive military edge through better technology is as old as warfare. A challenge today is that the rapid proliferation and diffusion of advanced technologies can render any advantage fleeting. The technological competition with great power adversaries today includes elements such as drone warfare, artificial intelligence (AI), autonomous systems, hypersonic weapons, freedom of maneuver in the electromagnetic spectrum, space and cyberspace capabilities, and many others. Crucial to transforming them into military advantage will be their continual integration into tactical and operational approaches. In some cases, new operating concepts such as ACE or JADO may create a demand signal for key enabling capabilities, while in others technological innovations may drive new warfighting approaches not previously considered.
- **Reputation:** A nation's standing as a reliable and trustworthy security partner is crucial for building agreements for access, basing, overflight, technology or information-sharing, and other areas. It can serve to attract new partners. It is foundational to being a trusted defense partner and to meet the NDS imperatives for integrated deterrence.

- **Intellectual edge:** Last but not least is the astute use of forces that superior winning tactics, operating concepts, and organizing constructs. It is not a substitute for mass or technology but acts as a force multiplier, increasing their effectiveness in operational application. As Ryan notes, it derives from both individual and institutional excellence. It requires that military leaders at all levels be able to creatively out-think and out-plan potential adversaries, requiring both deep and broad training, education, professional experience, and talent management. The institutional dimension depends in part on institutional learning – training and education, formal study and dissemination of lessons learned, and adaptation of new ideas into practical operating approaches that are then subject to continual feedback and refinement. Selective disclosure approaches apply to new operating concepts as well – selectively revealing aspects of new methods can bolster assurance and demonstrate combat credibility.

If geography, mass, time, technology, reputation, and an intellectual edge are the currency of military advantage, how do we accumulate it through day-to-day airpower activities so that we can cash it in during conflict? Any such activities occur over the *competition continuum*, which encapsulates a mixture of cooperation, competition, and armed conflict.^[27] These terms refer to the relationship between the United States and another strategic actor in relation to some set of specific policy objectives. Overarching objectives in cooperative and competitive activities will be to expand force employment options for the Joint Force while complicating it for adversaries. These will entail using day-to-day training and campaigning activities to improve readiness for peer conflict and expand the option space for decision-makers while simultaneously shaping the strategic environment to try to make it less likely (i.e., deterring aggression), which will be a careful balancing act. Specific opportunities to build and then exploit advantage in each part of the competition continuum are as follows.

Cooperation. Cooperative activities occur between strategic partners in pursuit of shared policy objectives. They are associated with mutually beneficial relationships between strategic actors with similar or compatible interests. Specific opportunities to build advantage through cooperative activities with allies and partners include:

- Development of collective agility by increasing interoperability and integration with allies and partners, to include agreements for access, basing, and overflight, cross-servicing, reciprocal use, and mutual support in crisis response.
- Highlighting foreign military sales and cooperative agreements that expand the web of forces able to operate together with a high level of proficiency.
- Securing legitimacy of joint force activities through public attribution.
- Conducting military engagement in support of humanitarian assistance and disaster response.
- Conducting combined force exercises with allies and partners to demonstrate strength of cooperative security agreements and integration of new operating concepts such as ACE.

These activities are not new ideas; what is new is that the contemporary information environment offers the opportunity to rapidly shape perceptions and attract new security partners by highlighting the benefits of integration with U.S.-supported or led coalitions. The advantage that cooperative activities generate derives from complementary or reinforcing benefits of integration with allies and partners. It does not require that all cooperating Air Forces field fifth-generation capabilities; instead, it may entail nations specializing to integrate high- and low-end capabilities with the depth and mass to credibly deter, and if required, defeat diverse threats.^[28] Such a “high-low” mix provides top-end capabilities for the most challenging missions while providing the mass needed to sustain ongoing commitments.

Competition. Competitive activities relate to actions that joint or multinational forces take outside of armed conflict against a state or non-state adversary in pursuit of policy objectives, but neither seeks armed conflict. Competitive activities to build advantage can include:

- Continuously integrating, demonstrating, and signaling new combat-credible capabilities and operating approaches that enhance lethality, reach, and resilience. Signaling or messaging centers on the ability that the capabilities provide to deny benefits, impose costs, or complicate adversary strategies.
- Illuminating and countering disinformation, propaganda, and malign influence.
- Reinforcing international norms and ensuring freedom of maneuver in the global commons.
- Actively managing signatures to diminish an adversary’s ability to build an accurate understanding of joint/combined force capabilities.
- Misleading adversary decision-makers on Joint/combined force dispositions, capabilities, and vulnerabilities to impose costs by diverting cognitive or physical resources towards unproductive ends.
- Deterring aggression, signaling resolve, or de-escalating confrontations through visible force maneuver.

Competition does not preclude armed conflict or cooperation in other areas. Competition with a great power may include elements of armed conflict with its proxies. Deterring aggression may be one objective of competitive activities, but it is not the only one. The common thread to the activities above is to expand the set of options available for joint/combined force decision-makers while complicating or narrowing it for adversaries, potentially by sowing doubt on their own approaches and capabilities. A balancing act in developing campaign approaches to weave together individual activities into a coherent whole will be to ensure that they do not result in inadvertent escalation and make armed conflict more likely. The risk of such escalation is particularly high due to ambiguous norms of behavior, actor thresholds, and complex domain interactions.^[29]

Armed Conflict. Armed conflict or war occurs when military forces take actions against an enemy in hostilities. The use of violence is the primary means by which an actor seeks to satisfy its interests. Here, the advantage accrued through cooperative and competitive activities is brought to

bear to achieve stated objectives. The use of airpower in armed conflict is well-understood, but the preceding discussion on the forms of military advantage motivates consideration of the following framing of that usage:

- Integrating and synchronizing actions in, from, and through the air domain, EMS, and the information environment to create desired effects in all domains in concert with the overall joint/combined force.
- Denying enemy freedom of action in space and cyberspace.
- Manipulating, disrupting, or destroying information and/or information systems needed by an enemy to sense, understand, and act.
- Overmatching adversary forces at decisive points, an understanding of which has been developed through cooperation/competition activities.
- Executing airpower pulses in contested/degraded environments to mass effects from dispersed operating locations.
- Adapting plans in accordance with commander's intent amid attrition and reduced force availability.
- Buying time and space using deception.
- Preserving power projection capability in support of future operations.

In conflict against a peer actor, the expectation is that such operations will take place in contested, degraded, or operationally limited environments – freedom of maneuver contested by enemy action, degraded due to failed systems or battle damage, and operationally limited because of the physical or operational environment. Such conditions have not been a part of much of the last 20 years of airpower, bringing new challenges through which all Airmen must be ready to prevail.

Airmen Development

Underpinning the activities described above will be the Airmen who make them happen. From basic military training through senior professional military education, Airmen must understand the part they will play in enabling the Air Force to build, maintain, and exploit competitive advantage in support of joint force requirements and U.S. national interests. To thrive and succeed in this endeavor, they must bring the following capabilities and behaviors to the fight.

Mission Ready. First and foremost, Airmen will be *mission-ready*^[30] to meet the challenges of great power competition and the potential for peer conflict. The roll-out of the Air Force Force Generation (AFFORGEN) model and ACE established initial principles for training Airmen in skills outside their core Air Force Specialty Code to meet the challenges of generating and sustaining airpower in a wide range of operating locations with light footprint teams. However, the renewed emphasis on great power competition and evolving the Air Force's force presentation model have increased the criticality of a warrior ethos for all Airmen, which must be integrated through all facets of training, development, e

and action. This means realistic team training on the full range of mission requirements throughout the AFFORGEN cycle, emphasizing the range skills needed across the spectrum of conflict. To be mission ready is to:

- Transcend specific technical training through an appreciation of the broader role Airmen must play when operating in potentially contested environments.
- Be able to solve complex problems related to generating and sustaining airpower under challenging conditions.
- Prioritize readiness based on mission effectiveness over functional competence.
- Operate as part of small, multidisciplinary teams able to solve complex problems with the resources at hand.

Not all Airmen will require advanced training for requirements such as ACE, but all must understand the practicalities of their roles in the application of airpower in support of great power competition as described in this paper.

Adept in the Information Environment. As with other Air Force capabilities, the development of plans that leverage informational capabilities, operations, and activities such as military deception, operations security (OPSEC), public affairs, EMS operations, and others^[31] will be the domain of trained specialists in those areas. However, given the pervasiveness, reach, and increasing weaponization of the global information environment, all Airmen must understand:

- The role that the information environment can play to affect perceptions and behaviors of a wide range of actors in ways that can hinder or support the success of joint force activities.
- How adversaries are using the information environment to leverage internal conflict within the United States for their own gain.^[32]
- How to recognize potential sources of disinformation and propaganda.^[33]
- The difference between using social media platforms and being used by them.^[34]
- Mission-related critical information that they must protect, whose inadvertent disclosure through innocuous social media posts or other means can undermine OPSEC and become subject to exploitation by adversaries.

Information warfare is not new, but what is new is the speed with which adversaries can leverage it to shape perceptions of reality at scale. Bots, troll farms, and AI are accelerating this trend. All Airmen must be able to recognize this threat and play a part in actively combating it.

Operate in Accordance with Mission Command Tenets. The Air Force's doctrine for mission command^[35] emphasizes distributed control and decentralized execution through the delegation of authority to empower subordinate decision-making, to enable flexibility, initiative, and

responsiveness in achieving commander's intent. It represents a considerable cultural shift from highly centralized approaches to operations that have been used in the past. It will require a non-punitive command culture to succeed. For individual Airmen it will mean learning:

- How to internalize commander's intent expressed in written orders, other guidance, and through direct interaction.
- When to exercise delegated authorities as operating conditions warrant.
- How to manage risk effectively in resource-constrained environments, which may entail diverting attention from less essential to more essential functions in rapidly changing circumstances.
- How to maintain the initiative in accordance with commander's intent when cut off from higher headquarters.

Mission command is not new nor is it new to the Air Force. However, prevailing in great power competition will require embracing its tenets to enable Airmen to operate effectively in dynamic, uncertain environments in which waiting for perfect information before making a decision will not be an option. Contingencies will frequently arise in dynamic situations, requiring Airmen to understand what actions they should or shouldn't take based on commander's intent, overall mission context, and acceptable levels of risk. Potential risks will vary at each echelon of command, requiring commanders to understand and communicate what constitutes risk at their level.

Operate Effectively with Allies and Partners. The NDS emphasizes the criticality of collaboration with allies and partners to meet shared global security challenges. Becoming effective at such collaboration is a skill that takes time and effort to develop and master. For Airmen it will entail:

- Learning similarities and differences (and the rationale for them) between different warfighting doctrines.
- Cultivating language and cultural skills that can enable effective force integration through resources such as the Air Force's Language Enabled Airmen Program[36]
- Participating in bilateral/multilateral exercises that center on command homeland defense or expeditionary power projection scenarios with realistic stressors.
- Understanding varying perspectives on how best to balance risk between force survivability and continuity of air operations.

A Mindset for Continuous Experimentation. One of the most interesting aspects of the implementation of ACE has been the wide range of Airman-driven innovation it has unleashed, including but not limited to collapsible ladders for F-16s[37] and F-22s[38] (both of which do not have built-in ladders); integration of off-the-shelf solutions for shelter, power, water, communications, and security;[39] cargo containers for B-52s;[40] and many others. In addition to providing capabilities that can help to meet the original intent of ACE, such innovations also have expanded the aperture of what constitutes airpower agility in the first place. ACE served as a forcing function to spark ideas. This type of Airman-driven feedback loop – high-level requirements driving innovative solutions that in turn create new possibilities for projecting combat power

essential element of building and maintaining a competitive edge with peer actors. Experimentation may pertain to new materiel capabilities, operating approaches, or joint/combined force formations.

Operation as Part of Human/Machine Teams. Rapid advances in AI have increased the interest across the Air Force and the entire DoD in the potential of human/machine teams, which in principle take advantage of the unique abilities of each while overcoming their respective limitations. This offers the potential to boost the processing rate of a wide variety of inputs, automate mission planning, analyze and summarize large data sets, create faster predictive targeting, and potentially have AI-based systems assume responsibility for certain functions. Broad frameworks for characterizing human/machine teams include human-in-the-loop, human-on-the-loop, and human-out-of-the-loop. Different models are under exploration for applications in capabilities ranging from mission planning to the Next Generation Air Dominance (NGAD) effort, which calls for a mix of crewed and uncrewed combat aircraft.[41]

The promise of these new capabilities comes with challenges that will ultimately fall on the shoulders of Airmen who will come to rely on such systems, making increased AI literacy a must. That literacy must come with an increased understanding of how best to leverage AI in support of airpower, particularly in tactical applications. Research over the past 30 years has shown that humans are significantly challenged in performing as successful monitors of complex automation systems, potentially suffering from poor understanding of what the systems are doing, high workload in interacting with them, and poor situational awareness when intervention is required.[42] As R&D in these capabilities continues, Airmen whose roles will bring them into contact with human/machine teaming architectures must learn to consider and articulate variables such as:

- The granularity of situational awareness they require to function effectively in a human/machine team, recognizing that it is an attack surface for adversaries to degrade overall system effectiveness.
- The levels of automation that may be desired across system functions over time, and to recognize when lowering it may be necessary in degraded conditions.
- The extent to which AI-based systems are transparent in explaining recommendations or actions, which will directly affect human trust in those systems.
- Circumstances in which an AI system should not be trusted, which may not be visible in laboratory conditions.
- Recognizing potential biases in AI-based recommendations, which may often be hidden.

Both technologists and operators will have a critical role to play in maximizing the potential for using AI to create military advantage.

Way Ahead

The different forms of military advantage described here can be fleeting – allegiances may shift over time, countermeasures to new capabilities emerge, and adversaries can learn to overcome new tactics by studying their implementation. Developing and maintaining such advantage is thus very much an infinite game. Prevailing in this critical contest will require all Airmen at all levels to understand what they are competing for, who they are competing against, who they are partnering with, and how to characterize success. The challenges are many – but so are the opportunities to use airpower smartly in cooperation, competition, and conflict to advance U.S. national interests.

Dr. Mulgund (BASC, University of Toronto; PhD, Princeton University) is a highly qualified expert senior advisor to the Deputy Chief of Staff for Operations (AF/A3). He is leading an Air Force-wide effort to develop and synchronize the implementation of an enterprise strategy for agile combat employment.

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