



# The Revolution in Military Affairs: 12 Observations on an Out-of-Fashion Idea

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**A**S A RALLYING cry for changing the U.S. military, the concept of a “revolution in military affairs” (RMA) has had a good run. From the middle of the 1990s into the beginning of the 21st century, the Pentagon used it to justify rewriting doctrine, overhauling organizational structures, and spending vast amounts of money on new weapons systems. Although the concept of a revolution in military affairs owed its lineage largely to historians (the “military revolution” of the 17th century) and Soviet theoreticians (the “military-technological revolution”), civilian and uniformed leaders in the U.S. military found the idea created a powerful resonance among politicians, pundits, and academics. For a while, one could not open a military journal such as *Joint Force Quarterly*, *Parameters*, or *Proceedings* without encountering an analytical piece measuring the role the then-current RMA played in shaping future warfare.<sup>1</sup>

Today, the rallying cry is dead. One would have difficulty in pinpointing the exact time and place of RMA’s demise. The exciting synergy of Special Forces and B-52s blasting the Taliban in 2001 seemed to renew its vogue. However, with the beginning of a full-blown insurgency in Iraq in late 2003, the use of “RMA” as a Pentagon mantra came to an abrupt end. The exact location of the phrase’s collapse is open to speculation, but one place to look for it might be along Route Irish, between the Green Zone and the Baghdad International Airport. Near the shell of a burned out Humvee one might also find the detritus of RMA’s associated concepts such as “perfect situational awareness” and “full spectrum dominance.” Our painful experience in Iraq destroyed most of the cherished (and banal) buzzwords the U.S. military carried blithely into the new century.<sup>2</sup> While historians may continue to find utility in the idea of revolutionary change in warfare, the U.S. military appears more than willing to let the RMA and its conceptual brood lie where they fell.

However, before we consign this ostensibly dead revolution to the dustbin of history and delete our PowerPoint references to the idea, we really ought

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IMAGE: Napoleon crossing the Alps, 1801, Oil on canvas, Jacques Louis David.

to consider what we might *retrieve* from the idea of a sudden, dramatic change in the way wars and warfare are conducted. After all, the RMA idea helped inspire a long-running dialogue between academia and the U.S. defense establishment over the origins of innovation and adaptation in military organizations. Iraq discredited our celebration of a unique, technology-based, “American RMA,” but the utility of the original concept endured challenges without the debunking of the core idea. The fad may have fallen out of fashion, but we should not forget its genesis as myopically as we embraced its gospel.

There are at least a dozen ways in which the RMA concept might still be useful in examining U.S. national security problems in the 21st century. The RMA idea is not likely to reappear as a catchy slogan, but the conceptual skeleton can still serve as a useful framework for analysis, especially when a historical perspective informs that analysis. Based on that belief, this discussion offers 12 assertions built on the out-of-fashion idea of a modern RMA and on historical examples. We can draw inferences from history that illuminate probable relevancy, but we cannot make prognostications. As strategist Colin Gray reminds us, “The future has not happened.”<sup>3</sup> History may be an imperfect tool in predicting the future, but it’s the best tool we have.

In making these 12 assertions, I seek a level of theoretical clarity by using the definitions offered by Williamson Murray and MacGregor Knox in their 2001 book, *The Dynamics of Military Revolution, 1300-2050*. In describing the phenomenon of dramatic discontinuities in military history, Knox and Murray distinguish between a “revolution in military affairs” and a “military revolution.” They describe the latter as an “uncontrollable, unpredictable, and unforeseeable” event which “fundamentally changes the framework of war” through seismic changes in both societies and military organization. An obvious example would be the French Revolution, which transformed France from an absolutist monarchy to a democratic republic while releasing forces that made the radically new ways of war prosecuted by Napoleon possible. A “revolution in military affairs” according to Murray and Knox, is a smaller, more limited phenomenon requiring “the assembly of a complex mix of tactical, organizational, doctrinal, and technological innovations in order to implement a new conceptual

approach to warfare or to a specialized sub-branch of warfare.” Murray and Knox argue that, if one compares a military revolution to an earthquake, then RMAs are the pre-shocks and aftershocks that accompany it. If, for example, World War I was the signature military revolution of the 20th century, then the birth of mechanized warfare, strategic bombing, and submarine warfare are a few of the RMAs that proceeded from the war’s powerful impact on society, technology, and military institutions.<sup>4</sup> Thus, we come to my first (and most obvious) assertion about revolutions in military affairs.

**1. Revolutions wait for no man (and no army, navy, or air force).**

Those slow to adapt to military revolutions and revolutions in military affairs are likely to suffer painful results. When the pace of change accelerates, the militaries that anticipate and adapt are likely to gain a massive advantage over potential enemies who are less agile. During the 1990s, RMA enthusiasts made this assertion in a variety of ways and, more often than not, accompanied it with a reference to the German *blitzkrieg* victory over France in 1940. The Wehrmacht’s triumph over the Allied armies was useful as an illustration, especially when accompanied with illustrations of panzer (i.e., armored) formations and Stuka dive-bombers. Yet, one could just as easily have referred to Napoleon’s stunning triumph over the Prussian army in 1806. In both cases, the loser had been slow to recognize the way that warfare was changing. In the case of 1940, the French were victims of the RMA. In 1806, a military revolution had the shoe on the other foot. The proud regiments of Frederick the Great’s army became a speed bump to Napoleon’s genius and the energies released by the French Revolution.

What does this mean to us now? It should inspire us to ask if the “American RMA” of the 1990s has run its course. In its aftermath, how adaptable are we? Has the U.S. military really fostered a culture that anticipates and exploits change? The Army’s school system advertises that it develops flexible and adaptable leaders. Is this just sloganeering? Who do we resemble the most, the Germans or the French in the *blitzkrieg* of 1940? These questions prompt a second assertion about revolutions in military affairs.



U.S. Navy

German Junkers Ju87b *Stuka* dive-bomber, c.1940.

**2. Those that live by the RMA may well die by the RMA, and in time, the competition will catch up.**

In 1813, when confronted with the evidence that his enemies were learning from their defeats, Napoleon said, “These animals have learned something!”<sup>5</sup> The French emperor’s victories had inspired reform and innovation in the armies of Prussia and Austria and encouraged such unlikely allies as Great Britain and Russia to join in a powerful coalition determined to crush the “Corsican Ogre.” Similarly, blitzkrieg lost its magic after the Wehrmacht overextended itself in the Soviet Union. From late 1942 until the fall of Berlin, the Germans experienced the Red Army’s version of blitzkrieg in the Ukraine, in Byelorussia, and along the Vistula. Like victory, the advantages that come from exploiting a revolution in military affairs are a “wasting asset.” A decisive military inspires imitation and adaptation by the enemy.

The examples of Napoleon in defeat and the Wehrmacht battered by the Soviets should inspire us to consider the “half-life” of the RMA we celebrated in the 1990s. U.S. leaders should ask themselves how far our real and potential enemies have gone in undermining the battlefield advantages we displayed

during Desert Storm and the invasions of Afghanistan and Iraq. How much longer should we consider our advantages decisive? Springing logically from this question is my next assertion.

**3. Dominance in an area of warfare will inspire others to launch their own RMA.**

A competitor’s strategic inferiority inspires him to innovate. Revolutionary change is a response to competition. Consider British naval dominance up to the 20th century. In 1906, when challenged by a growing German fleet, First Sea Lord Jackie Fisher and the Royal Navy answered by launching a warship of revolutionary design: the HMS *Dreadnought*.<sup>6</sup> When war came between Germany and Great Britain in 1914, the British held a decisive numerical advantage in this new form of battleship. The Germans made a timid challenge to this advantage in 1916 at Jutland and then let their surface fleet rust in port. Yet, by 1917, as U-boats savaged Allied merchant shipping, the British dreadnought advantage seemed almost superfluous. By using submersible vessels against Britain’s sea lines of communication, the Germans had launched their own RMA. For a period of several months, the U-boats threatened to starve Great Britain while the battleships of the Royal Navy languished at



HMS *Dreadnought* underway, c. 1906.

Scapa Flow. Similarly, in the aftermath of World War I, most of the world believed that France had the most powerful and effective army in Europe. During most of the interwar period, the mobilized strength of the French army dwarfed Germany's small, treaty-constrained *Reichswehr*. French (and Polish) dominance in men and materiel practically forced Germany to build a doctrine and a force structure that emphasized maneuver, low-level initiative, and combined arms cooperation. Building on these ideas, the German army of the 1920s began to assemble the components that debuted as a blitzkrieg on the Polish plains.<sup>7</sup>

Thus, apparently weaker forces can turn the tables on their enemies. With these examples in mind, one imagines that those who resent America's current dominance in military affairs will seek (to resurrect another former "hot" topic) an asymmetric answer to U.S. advantages on a modern battlefield. Al-Qaeda has given us a taste of this phenomenon, and one wonders what surprises the Chinese are developing. How many brigades of technicians in Beijing and Shanghai are at work countering U.S. advantages in surveillance technology, command and control systems, and precision munitions? This question leads to my next observation.

#### 4. Even before it matures on the battlefield, an RMA may generate a "counter-RMA."

If you advertise fabulous innovations, someone may notice. When you introduce revolutionary changes in doctrine, force structure, and technology, a wise competitor will be paying attention. Moreover, if you make a big fuss about your innovations, such a competitor will think hard about how to counteract them. Consider the case of strategic bombing prior to World War II. During World War I, German strategic bombing made a splashy but ultimately indecisive debut. Zeppelins and Gotha bombers caused a brief panic within the English population, but the technical limitations of these two bombing platforms caused them to have only a negligible effect on the war's outcome. Nevertheless, between the wars, airpower enthusiasts Giulio Douhet and Billy Mitchell suggested that improved bombers would wreak havoc on helpless civilian targets. In the 1930s, as Nazi Germany began to rearm, Hitler and Goering proclaimed the ability of the newly created *Luftwaffe* to play such a destructive role. In truth, the *Luftwaffe*'s strategic capabilities were limited, but the limitations were not immediately apparent to Germany's neighbors. In the diplomatic crises that preceded World War II, Hitler used the specter of a sky darkened by German bombers to intimidate his opponents.

Across the channel, the chief of the Royal Air Force (RAF) Fighter Command, Air Chief Marshal Hugh Dowding, paid close attention to the growth of the Luftwaffe. Anticipating what it would take to stop German bombing raids, Dowding began to put together the pieces of an integrated air defense system. By the time Goering turned his attention to bombing England, the RAF had built a network of radar installations, fighter bases, and local and centralized control stations. In the summer of 1940, when the first Heinkels and Messerschmidts appeared over the English coastline, they were confounded by the speed of the RAF's response. Nevertheless, the Battle of Britain was a "near-run thing," and the eventual British victory owed much to Dowding's vision as well as the Luftwaffe's limitations. Dowding had anticipated what it would take to defend against strategic bombing, the nascent RMA led by the *Luftwaffe*. What Dowding had launched, in effect, was a "counter-RMA."<sup>8</sup>

This example from three-quarters of a century in the past should give us pause. The U.S. military procurement process ballyhoos future systems and capabilities long before they appear in the inventory. To generate momentum toward a procurement decision, military contractors will field sexy prototypes and stage gaudy performance tests well before the decision to go ahead with production, and such is the nature of things that the new technology often fails to live up to the "hype" that surrounded its development. But how skeptical can future "peer rivals" afford to be about the claims made for new U.S. fighter planes, reconnaissance satellites, and ground combat systems? If a prudent competitor waits to see if a certain piece of gear works as advertised, then it risks losing the time it could use to develop countermeasures or rival systems. With the announcement of every new American weapons program, one can imagine the Chinese beginning to assemble a "research and development team" to develop countermeasures. (How many were working to neutralize the Future Combat System [FCS] before it was cancelled?) However, if innovation inspires countermeasures, how does one know when to quit worrying about countermeasures? The answer to that question leads us to the fifth assertion:

**5. The "almost" RMA from last time might be decisive next time.**

One must learn from near misses. Shipping

***One must learn from near misses.***

losses created anxiety in Great Britain during the spring and summer of 1917 when it appeared that the U-boat would become the decisive weapon of World War I. However, within months of instituting a convoy system, the Royal Navy had brought the U-boat menace under control. After the war, British admirals did not ignore the threat, but they believed that a convoy system and the new technological marvel, sonar, would thwart enemy submersibles. When war came in 1939, the *Kriegsmarine* had too few ocean-going U-boats to change such thinking. However, by 1942, Doenitz and company were able to put hundreds of U-boats into the sea, from bases in Norway and the Bay of Biscay that allowed easy access into the Atlantic shipping lanes. The Germans used new tactics that made effective use of wolf packs, aerial reconnaissance, and radio control from the mainland. A quarter-century after the crisis of 1917, the British found themselves once again pushed to the edge of defeat by a German U-boat fleet. The German boats of 1942 to 1943 were very similar to the ones deployed during World War I, yet when used in new ways, they created a renaissance of the "submarine RMA" previewed 25 years before.

World War II saw a similar revival for the tank. The tanks of 1918 played an important role in the Allied victory, but not a decisive one. Technical shortcomings limited the behemoths of 1917 and 1918 to the role of adjunct to the "poor bloody infantry" and the truly decisive weapon of the Western Front, artillery. Twenty years later, a relative handful of German panzers played a starring role in the blitzkrieg victories against Poland and the Western Allies. Combined arms doctrine, decentralized command and control, and technical improvements gave the tank a decisive role that only a few visionaries saw in the interwar years.

The cases of the U-boat and the panzer attacks suggest we can make old weapons play new tricks. This should make us wonder which weapons we have discarded that we could resurrect and put to good use on the battlefield.<sup>9</sup> Can we afford to seek

the “system-after-next” before we have exhausted the potential of the hardware we have?<sup>10</sup>

The examples of the U-boat and panzer also remind us that an RMA might result if we apply new “thoughtware” to old hardware. A handful of visionary leaders can take existing weapons and turn them into the instruments that win future wars. However, lest we believe individuals can manage the changing character of the battlefield, let us remember that, according to Murray and Knox, there are some changes so vast and fundamental as to slip the bonds of human control.<sup>11</sup> These changes lead to my next observation.

**6. We guide RMAs; we ride military revolutions.**

Dramatic changes in society and the conduct of war are usually beyond control. When Louis XVI lost his head to French revolutionaries, the dynasties of Europe feared the dangerous effects of the political upheaval that had gripped France and destroyed the Bourbon monarchy. However, neither the crowned heads of the continent nor their generals could have anticipated the mobilization of French national power that the upheaval made possible or the changes in warfare that resulted. It took an ambitious (and very lucky) young Corsican officer to realize the power of the new order and to exploit that power at Marengo, Austerlitz, and Jena. Yet, ironically, the same nationalism and reforming spirit that made Napoleon’s armies so formidable also inspired his enemies. By 1813, the energies the French Revolution released had turned on the man who had most benefited from them. Napoleon’s ultimate exile to St. Helena should encourage humility.

A survey of Napoleonic battlefields leads to my seventh assertion.

**7. Not all military revolutions and RMAs are technology-based.**

Political upheaval, social change, and economic development can change warfare dramatically. Again, Napoleon’s achievements offer a vivid example of this point. The weapons his *grogards* carried were essentially the same as those wielded by France’s opponents. At Auerstedt, Marshal Davout’s corps routed a Prussian force twice its size not because of its weapons but because of its revolutionary spirit, inspired leadership, and flexible tactical organization. French junior commanders were ready to exercise initiative when the situation

demanding it. Skirmishers operated as thinking individuals. Moreover, the changes in the economic and political order of Europe’s early modern period led to the first, true standing armies. As historians like Geoffrey Parker and Michael Roberts have argued, drill, discipline, a reliable wage, permanent military units, and a relatively efficient tax-collecting bureaucracy gave Europe an edge against armies outside the continent. Flintlocks, caravels, and *trace italienne* forts played a key technological role in extending European military superiority around the world, but one can argue that it was the “software” of military innovation as much as the hardware that made the difference.

Thus, before the “revolutionary changes” of the 17th century, Ottoman Turkey was capable of periodic invasions deep into Europe; Turkish troops besieged Vienna as late as 1683. However, once the Habsburgs were able to field forces that exhibited all the advantages of drill and discipline, the retreat of the Ottomans began.

Why is this important to us? As Americans, we tend to be keenly sensitive to technological innovation among our competitors and potential rivals. Thus, during the Cold War, the Defense Intelligence Agency painted pictures of emerging, potential, and even fanciful enemy weapon systems. We have filled our threat assessments with analyses of existing enemy systems and hostile development efforts, but have not stopped to consider that such a focus could blind us to other trends in the world. Did we overlook the rise of militant jihadism because of our fascination with North Korea’s enrichment of fissionable materials? Even when we see a trend or threat clearly, does our parochialism cause us to misinterpret what we see? This line of thought leads to my next assertion.

**8. One service’s RMA may marginalize another service.**

What seems wonderfully “revolutionary” to one branch of the military may not look that way to another. When the first tanks crawled across no man’s land in September 1918, the prescient saw that war would never be the same: the internal combustion engine, not horseflesh, would generate shock action on the battlefield of the future. Yet few cavalymen accepted this vision. Cavalry advocates fought a bitter delaying action against the primacy of the tank in the field of mounted warfare. Infantrymen, as well,

did their best to limit armored forces to a supporting role and keep the tank “mavericks” in their place.

Similarly, when the U.S. dropped atomic weapons on Japan in August 1945, no one needed a crystal ball to see that warfare was on the verge of a sea change. Yet within the U.S. military, the changes ushered in with the nuclear era created a class of winners and losers; the newly independent U.S. Air Force and, in particular, the Strategic Air Command, justifiably saw itself as the essential component of America’s security and thought that if the other services were marginalized, so be it. The U.S. Navy could patrol the seas, and the Army could guard airbases and police up the nuclear battlefield, but the Strategic Air Command’s massive bombers would carry the load of deterrence and warfighting. Fearing marginalization, the U.S. Navy launched the “revolt of the admirals,” while the Army was inspired into ill-conceived experiments like the “Pentomic Division.” Both services were scrambling to find a role on the nuclear battlefield.

Fast forward to the end of the century. The Air Force and, to a lesser extent, the Navy, seemed well positioned to benefit from the “American RMA” of the 1990s. Prophets predicted that advances in communications, satellite imagery, and precision targeting would remove the “fog and friction” from the battlefield and foster “perfect situational awareness.” In the sterile atmospheres of the sky, space, and sea, no enemy would be able to hide from America’s wonder weapons. The Army, fearing for its future in such a battlefield, created a transformation that made similar but less credible claims for battlefield dominance in ground combat.<sup>12</sup> In adapting to the new realities of 21st-century war, the visionaries of the three major services should pause over the next assertion.

### **9. The lasting lessons of military history were paid for in blood.**

Building doctrine to exploit a revolution in military affairs cannot be divorced from experience. During World War I, the results achieved from strategic bombing were meager. Zeppelins created a brief panic among the English populace, and four-engine bombers achieved a modest civilian death toll from their somewhat random attacks. Nevertheless, shortly after the end of the war, the first prophet of airpower, Giulio Douhet, predicted that strategic bombing would be the decisive form

***Building doctrine to exploit a revolution in military affairs cannot be divorced from experience.***

of warfare in the future. Armies and navies would become superfluous and attempts at aerial defense would be futile. Inspired by Douhet and by their own maverick of airpower, Billy Mitchell, the U.S. Army Air Corps developed a strategic bombing doctrine that called for American heavy bombers to cripple an enemy’s war effort by striking key targets in the enemy’s homeland.

The doctrine assumed that such targets existed and could be identified. It assumed that bombers could find their way to these targets and drop their bombs accurately enough to hit the targets and that the targets would be vulnerable to destruction from the air. Most important, the doctrine assumed that an enemy would be unable to defend against such attacks. The doctrine writers at Air Corps Tactical School at Langley built their assumptions about target identification and navigation on intelligence capabilities that were uncertain and technology that was unproven. However, in assuming that U.S. bombers would not need to achieve air superiority before exploiting the promise of strategic bombing, they contradicted one of the more salient lessons that came out of World War I—that enemy air forces have to be beaten before the full capabilities of air power can be used against targets on the ground.<sup>13</sup> Between 1914 and 1918, aviators had paid for this lesson in blood. The U.S. Eighth Air Force paid the blood price for the lesson yet again in the skies over Regensburg and Schweinfurt. Americans tend to be too casual in their historical analysis. The lessons learned in the skies of Nazi Germany should remind us to keep our enthusiasm over innovation in perspective. Perhaps part of the problem for the interwar Army Air Corps was the lack of a clear enemy against which to test its ideas. This observation leads to my next assertion.

### **10. Leadership in an RMA is difficult to sustain without a credible strategic threat.**

Effective innovation needs a real threat to focus on. In his review of interwar innovation, Williamson Murray noted that the military institutions

most successful in anticipating the problems of future battlefields were those that studied specific problems posed by specific enemies.<sup>14</sup> The U.S. Navy and Marine Corps offer perhaps the clearest example of this point in the years prior to 1941. Both services anticipated that the most likely enemy of the future would be the Japanese Empire. With that in mind, they created and refined War Plan Orange as a framework for preparing for war against the Japanese. Whether it was war games at the Naval War College, or Major Pete Ellis's prescient studies of amphibious operations, the Navy and Marine Corps focused their exercises, their weapons development, their training programs, and their experiments against that specific enemy. That focus became the basis for successful innovation in two nearly brand-new forms of combat—carrier warfare and amphibious assault against fortified islands. Focused interwar innovation laid the basis for U.S. victories at Midway and Guadalcanal.

That effective innovation requires a clear perception of the threat is a conclusion that should give us pause. The United States faces an ongoing conflict in Afghanistan. Yet the Pentagon will not have the luxury of putting an exclusive emphasis on counterinsurgency. There are just too many other, different dangers on the horizon. America cannot do as Great Britain did during the 1920s, skimp on defense budget while devoting some attention to imperial policing, some attention to homeland defense, and relatively little attention to the threat of conventional war with Germany over the horizon. Similarly, the U.S. Army's recent transformation was oriented on capability rather than a concrete threat. One could argue that it was a poor target on which to focus one's efforts.

Like America during the interwar period, Japan benefited from preparing for war against a clearly defined enemy. However, for the Japanese, the skill of their carrier pilots, the bravery of their infantry, the agility of the Zero, and the lethality of the Long Lance torpedo were not enough to overcome a fundamental mistake, the mistake of making war against an enemy whose war-making potential dwarfs your own. My 11th assertion follows:

**11. Leadership during an RMA cannot overcome grievous strategic miscalculation.**

Tactical brilliance and technological wizardry will not compensate for taking on more enemy

than you can handle. Imperial Japan is the conspicuous example of this point. Whatever lead it held in carrier aviation was not nearly enough to overcome American industrial might (even without the catastrophe at Midway). They consciously gambled on American resolution and lost big. Hitler is another poster child for this point. Hitler rode the blitzkrieg RMA across the Polish plains and around the Maginot Line. However, the Wehrmacht's tactical skill and opportunistic campaigning came up short against the Soviet Union, with its vastness, its weather, and its military's phoenix-like ability to regenerate divisions. The myth of German invincibility died, frostbitten, on the approaches to Moscow. Hitler compounded his strategic fiasco by a gratuitous declaration of war against the U.S. that same winter.

A more recent example is close at hand. Given the limited strength of our ground forces, hindsight suggests that the U.S. signed up for at least one war too many in 2003. The sprint to Baghdad in March and April of that year looked like blitzkrieg. It seemed brilliantly decisive and economic in human costs. Now, seven years later, we are hard pressed to find enough troops to fight our wars in Iraq and Afghanistan. We may find ourselves robbing Peter in Ramadi to pay Paul in Kandahar.

At least part of the problem, according to some, was our inability to project a path to the political end state we desired beyond the dazzling battlefield victories. We are having to relearn the fundamentals of counterinsurgency while "making do" with forces spread thin around the world. The ghost of Clausewitz haunts us: we have been painfully reminded that war is indeed a political phenomenon. This brings me to my 12th and last assertion.

**12. The fundamental nature of war is impervious to military revolutions and RMAs.**

Weapons change; people and their motives do not. Clausewitz made the point that war is a political phenomenon almost two centuries ago. Two millennia before that, Thucydides offered similar insights about what motivates men to go to war and what sustains them. As Americans, we put more faith in engineering skills than in our historical memory. We have more confidence in our weapons than in the breadth of perspective that informs their use. At the beginning of the century, the evangelists of "American RMA" argued that we could drive



uncertainty and confusion off the battlefield the way we had chased the Iraqi Army out of Kuwait. Now, 19 years after Desert Storm, we have been offered a dose of humility that might moderate our faith in technology.

This essay began by suggesting that military professionals have largely jettisoned the concept of “the revolution in military affairs.” The *Joint Force Quarterly* articles that celebrated it have been shredded, and the PowerPoint briefings that proclaimed it have been recycled into the vast reservoir of electrons in the Pentagon’s servers. Like many of the products American industry used

to make, the revolution in military affairs had passed its point of “planned obsolescence.”

For the most part, the analysis of revolutionary changes in warfare has been left to the historians. They can make of it what they will. Even so, there is still value in studying revolutions in military affairs, not only for the historian, but for the military professional as well. Perhaps the humility we have learned in the last several years will enable us to reach into the dustbin of history, clean up the idea of a revolution in military affairs, and find some new uses for it. **MR**

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## NOTES

1. The reader will quickly realize how much this article owes to the ideas of Williamson Murray and MacGregor Knox and especially their collaboration on the anthology, *The Dynamics of Military Revolution: 1300-2050* (New York: Cambridge University Press, 2001); Allan Millett and his collaborative collection with Williamson Murray, *Military Innovation in the Interwar Period* (New York: Cambridge University Press, 1996); Colin Gray especially, *Strategy for Chaos: Revolutions in Military Affairs and the Evidence of History* (London: Frank Cass, 2002) and *Another Bloody Century: Future Warfare* (London: Phoenix Books, 2006); and Frederick Kagan, *Finding the Target: The Transformation of American Military Policy* (New York: Encounter Books, 2006).
2. There are ugly rumors that the *revolution in military affairs* staged its own demise in order to cover its defection to China.
3. Colin Gray, “How Has War Changed Since the End of the Cold War?” *Parameters* (Spring 2005): 14-26.
4. See, in particular, Williamson Murray and MacGregor Knox, “Thinking about revolutions in military affairs,” in their anthology, *The Dynamics of Military Revolution, 1300-2050* (New York: Cambridge University Press, 2001), 1-14.
5. Hans Delbruck, *History of the Art of War*, trans., Walter Renfro (Lincoln: University of Nebraska Press, 1990), 452.
6. Current scholarship suggests that, eventually, Fisher wanted to rely more heavily on smaller vessels. See Nicholas Lambert, *Sir John Fisher's Naval Revolution* (Columbia: University of South Carolina Press, 1999), 120-26.

7. This is probably best described in James Corum’s *The Roots of Blitzkrieg: Hans von Seeckt and German Military Reform* (Lawrence: University Press of Kansas, 1994).
8. Air Chief Marshal Hugh Dowding’s vision is described in Williamson Murray, “Innovation: Past and Future,” in *Military Innovation in the Interwar Period*, eds. Williamson Murray and Allan Millett (Cambridge: Cambridge University Press, 1996), 305-308.
9. Another example, mine warfare, so prominent in the Vietnam War, has found its renaissance in the “IED.”
10. I suspect that those who crew our B-52 fleet might argue that the idea of resurrecting old hardware can be taken to extremes.
11. Murray and Knox, 6-7.
12. In its unhappy attempts to ape the “technological utopianism” (Williamson Murray) of the Air Force and Navy, some criticized the Army for falling into the worst tendency of the other two services: reducing tactics, operations, and strategy to “targeting problems.”
13. Williamson Murray, “Strategic Bombing: The British, American, and German experiences,” in *Military Innovation in the Interwar Period*, edited by Williamson Murray and Allan R. Millett (New York: Cambridge University Press, 1996), 114-16.
14. Murray, “Innovation: Past and Future,” from *Military Innovation in the Interwar Period*, edited by Williamson Murray and Allan R. Millett (New York: Cambridge University Press, 1996) 311.