1st Combat Camera Squadron (James D. Mossman)

Thinking About Revolutions in Military Affairs

By WILLIAMSON MURRAY

The term *revolution in military affairs* (RMA) is a buzzword inside the Beltway and among academics interested in defense affairs. As Dennis Schowalter noted at a recent conference, "RMA has replaced TQM [total quality management] as the acronym of choice" among members of the Armed Forces. One suspects that much of this enthusiasm, which rests upon only the slightest knowledge of the historical record, may distort as much as it helps in thinking about military change and innovation. Yet one must also admit that military events of late suggest major changes in technology and weapons with substantial implications for conducting war in the next century.

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This article suggests how one might think about RMAs of the past and the implications of the historical record for the future. The views reflect the influence, comments, and thoughts of colleagues in the historical profession.[1]

First, historians have done relatively little work on RMAs. Michael Roberts introduced the idea of a single military revolution in his inaugural lecture at Queens University Belfast in 1955. Thereafter until 1991, interest in *the* military revolution was focused on the 16th and 17th centuries; early modern historians argued among themselves about whether there was such a revolution and, if so, when it occurred and what form it took. That debate continues. Since the mid-18th century, however, military historians have concentrated on other issues such as innovation, effectiveness, adaptation, organizational behavior, or—the bread and butter of the profession—battle

Figure 1. Possible RMAs

14th century
—longbow: *cultural*

15th century
—gunpowder: *technological, financial*

16th century
—fortifications: *architectural, financial*

17th century
—Dutch-Swedish tactical reforms: *tactical, organizational, cultural*
—French military reforms: *tactical, organizational, administrative*

17th–18th centuries
—naval warfare: *administrative, social, financial, technological*

18th century
—British financial revolution: *financial, organizational, conceptual*
—French Revolution: *ideological, social*

18th–19th centuries
—industrial revolution: *financial, technological, organizational, cultural*

19th century
—American Civil War: *ideological, technological, administrative, operational*

late 19th century
—naval war: *technological, administrative, cultural*

19th–20th centuries
—medical: *technological, organizational*

20th century
—World War I: combined arms: *tactical, conceptual, technological, scientific*
—*Blitzkrieg*: *tactical, operational, conceptual, organizational*
—carrier war: *conceptual, technological, operational*
—strategic air war: *technological, conceptual, tactical, scientific*
—submarine war: *technological, scientific, tactical*
—amphibious war: *conceptual, tactical, operational*
—intelligence: *conceptual, political, ideological*
—nuclear weapons: *technological*
—people's war: *ideological, political, conceptual*

histories. Modern historians quite simply have not been very interested in military revolutions.

In a sparsely attended session at the March 1991 meeting of the Society of Military History, Clifford Rogers suggested that there was not one military revolution but a series that reached from the middle ages to the present day. He said they may have begun as early as the 14th century and continued with increasing frequency as one neared this century. Not surprisingly there has been a rush to examine virtually everything from the strategy of Edward III to *Blitzkrieg* operations in the light of what we call *revolutions in military affairs*. The crucial point is that the historical record is not yet in; and until there is detailed research on the subject most commentaries may be distortive. At a recent conference, I listed possible RMAs along with the driving forces behind them. Although not inclusive, it suggests the complexities and ambiguities found in the historical record (see figure 1).

The list suggests a number of points. First, given the enthusiasm for describing the coming RMA as technological, the historical record suggests that technological change represents a relatively small part of the equation.[2] Moreover, military history over the last eighty years offers many cases in which forces with inferior technology have won conflicts. The record further suggests that the crucial element in most RMAs is conceptual in nature. In the breakthrough on the Meuse, for example, the German advantage was a combined arms doctrine resting on a thorough and realistic appraisal of the last war. Their opponents had not developed such a doctrine.[3]

In fact there is only one example on the list of possible RMAs that is entirely technological: nuclear weapons. But even here there is some ambiguity since the impact of nuclear weapons has been almost entirely political except for their first use against the Japanese. Outside of great power competition, nuclear weapons have *not* changed the nature of warfare. What the historical record implies, therefore, is that technology has played only one part in these revolutions, and frequently a relatively insignificant part.

Secondly, the record suggests that historians and others using the concept should rethink RMA terminology. Even the idea of a series of revolutions distorts history and misses a number of complex and ambiguous interactions. The current reading of the evidence indicates a linear series of discrete revolutions that are readily discernable and therefore easily managed.

Military Revolutions

Evidence, however, points in another direction.[4] There appear to be two distinct historical phenomena involved in radical innovation and change. The first can be called military revolutions. These were by far the more important, for they fundamentally changed the nature of warfare in the West. There appear to have been four (two occurring at the same time): creation of the modern, effective nation-state based on organized and disciplined military power in the 17th century; the French Revolution and the industrial revolution beginning at the same time during the period 1789–1815; and World War I, 1914–18. We might compare them in geological terms to earth-

Naval Historical Center

Battery Sherman, Vicksburg.

quakes. They brought with them such systemic changes in the political, social, and cultural arenas as to be largely uncontrollable, unpredictable, and above all unforeseeable. Therefore those who expect the "information revolution" to bring radical social and cultural changes—if they are correct—will find that the direction, consequences, and implications of such a revolution will be largely unpredictable for both society and military organizations.

Such "military revolutions" recast the nature of society and the state as well as of military organizations. By so doing they altered the capacity of states to project military power and allowed the military to kill people and break things ever more effectively. Moreover, these revolutions do not replace but rather overlay each other. Consequently, all the new technology in the world will not help an Iraqi army fight coherently on the modern battlefield because Iraqi society has not gone through the creation of a modern state, and the government lacks the capacity to infuse its citizens with the fervor of the French Revolution. On the other hand, a Vietnamese communist movement, which combined the revolutionary enthusiasm and fervor of the French Revolution in a xenophobic culture, defeated two great Western powers.

"military revolutions" do not replace but rather overlay each other

These four military revolutions raise a number of points. The 17th century revolution laid the basis for the modern state. Until that point, armies and navies were under only the loosest control of central governments. Their employers more often than not failed to pay the troops who in turn looted and pillaged. The result was the catastrophe of the Thirty Years War which devastated Germany and the sack of Antwerp where unpaid Spanish soldiers mutinied, thus undermining Spanish policy in the Netherlands. The action of the Spanish soldiery reflected both their disobedience and the inability of the state to compensate them. The 17th century revolution created military organizations that in Machiavelli's conception not only imposed the laws but responded to them in civil as well as military terms. As the Swedish Articles of War in the early 17th century made clear, soldiers would dig when they were told to dig—a conception that had not always marked the performance of warriors in the Middle Ages. In the macro sense, the European military organizations that emerged in the 17th century were more effective on both the battlefield and in the conduct of civil affairs because they were responsive to the orders of the state bureaucracy. Once the state was able to collect taxes it could pay soldiers on a regular basis; in turn, it demanded that soldiers maintain discipline on the battlefield and in garrison. We take for granted the discipline and responsiveness of Western military institutions and their imitators (such as the Japanese and Indians); but the history of South America and much of the Third World over the past forty years suggests that this political relationship is not always a given.

The French Revolution established the norms for the mobilization of economic, scientific, and popular resources. It interjected ideology and nationalism into the equation of war in the West, and the ferocity of that combination goes a long way toward explaining the 25 years of war that followed (the French Revolutionary and Napoleonic Wars) as well as the thirty-year German war of 1914–45. Faced with foreign invasion brought on by their own ill-considered policies, the political leaders of 1789 declared a *leveé en masse*, which placed citizens and their goods at the disposal of the state for the duration. The result was that the French tripled their army in less than a year and, although they remained less effective in battle than their opponents on a unit to unit basis, they could accept casualties and fight on a scale like no other 18th century military formation. As Clausewitz noted:

> *Suddenly war again became the business of the people—a people of thirty millions, all of whom considered themselves to be citizens. . . . The people became a participant in war; instead of governments and armies as heretofore, the full weight of the nation was thrown into the balance. The resources and efforts now available for use surpassed all conventional limits; nothing now impeded the vigor with which war could be waged, and consequently the opponents of France faced the utmost peril.*[5]

U.S. Army Military History Institute

The American front, November 18, 1918.

It was not until adversaries were willing to fight on the same terms, namely the national mobilization of resources and manpower, that France was finally brought to heel. But its revolutionary example would be replicated by combatants in the American Civil War and later in the fierce killing contests of the two world wars in this century. As suggested above, the French Revolution would find an echo in far off Indochina in the wars waged against the French and later the Americans.

Concurrent with the French Revolution, the first stages of the industrial revolution were already underway in Britain. That upheaval changed the entire economic underpinning of British society and placed unimagined wealth in the hands of political leaders. The industrial revolution did *not* provide the military with technological improvements that helped its soldiers on the battlefield; if anything the British army fought in a retrogressive fashion compared to the French. But while the revolution had little influence on the battlefields of the Napoleonic wars, it provided British governments with enormous financial resources to cobble together and support the military coalitions that eventually defeated Napoleon.

The industrial revolution first influenced the battlefield during the Crimean War, when the rifled musket, telegraph, and steamship combined to allow Britain and France to deploy forces and win against superior Russian numbers. But neither side was willing to seriously mobilize national passions, manpower, and resources. It was left to the opposing sides during the Civil War in the United States, South as well as North, to combine the "benefits" of technology (the railroad, steamboat, rifled musket and artillery, and telegraph) with the French Revolution's mobilization of the populace and national wealth. The result was a terrible killing war of four years which owed its duration to a combination of the three "military revolutions" that had occurred up to that time: the strength of the nation-state, its ability to mobilize society, and the enormous resources and new weapons of the industrial revolution.

In many ways World War I reaffirmed the lethal combination of these revolutions. But in its own way that conflict was a profoundly revolutionary event that fundamentally shattered the Western equilibrium with immense political, economic, and social consequences. The political consequences of the war itself, one could argue, did not end until the autumn of 1989. But of all military revolutions, World War I should be regarded as the most revolutionary in military terms. It involved creating combined arms, exploitation tactics, strategic bombing, unrestricted submarine warfare, carrier operations, and even amphibious war. Admittedly, in some aspects the weapons, technology, and tactical concepts provided only a glimpse into the future, but the glimpse was there nevertheless. Perhaps the best way to illustrate this point is to suggest that a British or German battalion commander from the battlefields of summer 1918 would have understood the underlying concepts of the battlefields of 1940, 1944, and even 1991. A battalion commander of 1914, however, would not have had the slightest clue as to what was occurring in 1918: that was how far military affairs travelled in the course of four years.

RMAs

What then are military professionals to make of these great revolutions that have rocked the history of the West and the world since the 17th century? Probably not much. At best, if they are able to recognize such events, they can hold on and adapt to trying and difficult times. History does

suggest smaller phenomena that might best be termed RMAs. In these cases there is profound evidence that the right military institution and culture can gain a significant advantage.

If military revolutions are compared with earthquakes, we can think of RMAs as pre- and aftershocks. During the process of developing RMAs military organizations must come to grips with fundamental changes in the political, social, and military landscape; they innovate and adapt to—in some cases foreshadow—revolutionary changes. RMAs involve putting together the complex pieces of tactical, societal, political, organizational, or even technological changes in new conceptual approaches to war. The formula is rarely apparent at the time, and even historians with access to the documentary evidence find it hard to reconstruct the full concept. The results on the battlefield, however, make it chillingly clear which military organization has done better at innovating and adapting. Before proceeding we might want to look at where possible RMAs fit with the larger phenomena of military revolutions (see figure 2).

RMAs take considerable time to develop even in wartime

There are several historically interesting aspects of RMAs. First, most take considerable time to develop even in wartime; and peacetime RMAs even in the 20th century have taken decades. One can argue over the accuracy of applying the term *revolutionary* to concepts and capabilities that take such a long time to emerge. There is also the matter of perspective. To the French and British what happened on the Meuse in summer 1940 and afterwards undoubtedly appeared revolutionary. To the Germans the doctrine and capabilities that destroyed the Allies in the battle of France would have appeared revolutionary. Moreover, what is clear today was not apparent to those who fought then. For example, many German officers in May 1940 would have attributed their success to the fanaticism that Nazi ideology had infused into the fighting spirits of their troops. And there would have been some legitimacy to that view, given German perseverance in crossing the Meuse despite casualty figures in lead companies that reached upwards of 70 percent.

Originating an RMA in wartime is difficult enough. The combined arms revolution during World War I, which saw development of accurate indirect artillery fire with decentralized infantry tactics that relied on fire, maneuver, and exploitation, emerged from the slaughter on the Western Front in 1917 after three long years of learning. And the details of that revolution were not entirely clear when the war was over, as the fate of the British and French in the interwar years underscores. In fairness to the World War I institutions that grappled with systemic and intractable problems in an atmosphere of fear, confusion, and ambiguity, it was not until the 1980s that historians began to unravel what actually took place on the battlefield between 1914 and 1918.

If the problems of adapting to wartime conditions are difficult, those involved in peacetime innovation are a nightmare. Michael Howard has compared the military in peacetime to a surgeon preparing for a series of operations at an unknown time and place under unidentified conditions without the benefit of having previously worked on live patients.[6] Rather, he must rely entirely on what he has read and on incomplete and inaccurate models. Similarly, military organizations are called on to function in the most trying circumstances, which simply cannot be replicated in peace. And they frequently have limited resources to prepare and train. Yet the record, as demonstrated by the German campaign against Western Europe in 1940, suggests that some militaries have done better than others. The results of that were equivalent to what most would agree represents an RMA.

Here history contributes to thinking about what kinds of military institutions and cultures the

Figure 2. Military Revolutions and RMAs

Preshock RMAs: *longbow, Edward III's strategy, gunpowder, fortress architecture*

Military Revolution: *17th century creation of the modern state*

Direct- and Aftershocks: *Dutch and Swedish tactical reforms, French tactical and organizational reforms, naval revolution, Britain's financial revolution*

Preshock RMAs: *French military reforms (post Seven Years' War)*

Military Revolutions: *French and industrial revolutions*

Direct- and Aftershocks: *national economic and political mobilization, Napoleonic way of war, financial and economic power based on industrialized power, technological revolution of war (railroads, rifles, and steamboats)*

Preshock RMAs: *Fisher Revolution (1905–14)*

Military Revolution: *World War I*

Direct- and Aftershocks: *combined arms,* Blitzkrieg, *strategic bombing, carrier warfare, unrestricted submarine warfare, amphibious warfare, intelligence, information warfare (1940–45), stealth*

U.S. Navy

Omaha Beach, June 6, 1944.

United States needs to prepare for the next RMA. Historians tend to argue that military organizations are focused on the last war and thus have substantial problems with the next conflict; for example, the traditional image of a revolutionary German army jumping into the future with its *Blitzkrieg* tactics while the British and French, still locked in World War I, failed miserably.

Nothing is farther from the truth. Almost immediately after World War I, the *Reichsheer*, under its first chief of staff and second commander, General Hans von Seeckt, organized no fewer than 57 committees to study what really happened on the battlefield of 1918 in excruciating detail. He charged those examiners to produce:

> *short, concise studies on the newly gained experiences of the war and consider the following points: What situations arose in the war that had not been considered before? How effective were our prewar views in dealing with the above situations? What new guidelines have been developed from the use of new weaponry in the war? Which new problems put forward by the war have not yet found a solution?*[7]

The crucial point is, as Seeckt's last question emphasizes, that the Germans used a thorough review of recent military events as a point of departure for thinking about future war.

Moreover, the spirit of this examination depended on an attitude that Ludendorff expressed in his memoirs about visits to the front: "[Staffs] knew I wanted to hear their real views and have a clear idea of the true situation, not a favorable report made to order."[8] The result was that German doctrine, first crystallized in 1923 and then reworked by Generals Werner von Fritsch and Ludwig Beck in 1932 shortly before they took over direction of the army as commander in chief and chief of staff respectively, reflected actual conditions on the battlefield of 1918. Germany then built on that experience in a coherent, careful, and evolutionary fashion. There was nothing revolutionary about German armored tactics; they fit within a larger conceptual framework of combined arms that rested on exploitation, decentralized decisionmaking, and fire and maneuver—that is, the battlefield of 1918. This process of rigorously examining the past carried over into the German evaluation of current exercises and training.

The French army took no such approach. The examination of the recent past was used to justify current doctrinal trends. In other words, they knew the answer before they started looking.

The British case was even more depressing. It was not until 1932 that the chief of the Imperial General Staff, Field Marshal Lord George Francis Milne, saw fit to establish a committee to study lessons of the previous war. Admittedly the committee was given wide latitude: it would examine World War I and determine if its lessons were being adequately addressed in manuals and training. Unfortunately its report was submitted to the next chief, Field Marshal Archibald Montgomery-Massingberd, and the whole effort was deep-sixed since its critical review of army performance in 1914–18 might have made that service look bad. If the British did not get the revolution in armored and mechanized warfare right, critics like J.F.C. Fuller and Basil Liddell Hart were further off the mark. In fact, much of British failure on the battlefields of 1941–42 in North Africa was due to slavish reading of Fuller's argument that armor operated best on its own. Yet there is another point regarding RMA in land warfare during the early 1940s. Starkly put, recent research has stressed that the French army did a miserable job in training its soldiers to face the great test in 1940. Had its units on the Meuse followed doctrine there is a good chance that the German infantry crossings on May 13 would have failed.

If various military organizations misused or misinterpreted history in the interwar period, others completely rejected its relevance to the problems of the day. The Royal Air Force repudiated history entirely and its leaders argued that technology had rendered the past irrelevant.

DOD

Airborne ambulance, Vietnam.

Rather than study air operations in World War I, one could leap into the future to base doctrine, force structure, and employment concepts entirely on theoretical conceptions of what war should look like. Such an approach had a crucial and detrimental impact on the British strategic bombing campaign during much of World War II. One can argue that the lessons of World War I were not entirely clear with respect to strategic bombing and its effects on an enemy nation. Two things were clear, however, from the aerial combat of 1914–18.

First, such air operations required air superiority. Absent that, bombers and reconnaissance aircraft suffered unacceptable losses. Second, finding and hitting targets under anything other than perfect daylight conditions posed intractable challenges. As one naval officer noted of escapades during World War I night operations,

> *. . . experience has shown that it is quite easy for five squadrons to set out to bomb a particular target and for only one of those five ever to reach the objectives; while the other four, in the honest belief that they have done so, have bombed four different villages which bore little if any resemblance to the one they desired to attack.*[9]

Such lessons disappeared from the organizational memory of the Royal Air Force.

The result of the unwillingness to learn from the past was that the British went into the war with almost a religious belief in the survivability of bombers and that finding and destroying targets, if a problem at all, would not be difficult to solve. Such belief in the irrelevance of the past became unwillingness to learn from the present. There were plenty of warnings in terms of exercises that suggested that the Royal Air Force was going to have a hard if not impossible time identifying and hitting targets at night or in bad weather. In turn, the confidence that bombers would always get through led British senior officers to go so far as to suggest that long-range escort fighters were technologically infeasible. They made this argument early in World War II with no technological or scientific evidence to support it. What occurred was a process by which their mental jump into the future without reference to the past caused them to minimize technological possibilities because those possibilities did not fit into their preconceived notion of the future.

American airmen did not fare much better. At least Billy Mitchell, despite the stridency of his arguments, recognized the underlying lesson of the air war in World War I: air superiority was required before airpower could be effectively employed. But by the early 1930s, airmen at the Air Corps Tactical School had discarded such realism and blithely argued that great formations of self defending bombers could fly deep into an enemy nation without the protection of long-range escort fighters and only sustain acceptable casualties. The proclivity to disregard the past as well as the present—that is, a general disregard for an evidentiary-based approach to the preparation of military forces—carried over to the war in the case of both forces. And they continued to execute their operational and tactical frameworks well into 1943 despite unequivocal evidence of problems in their assumptions and thus the results. In the end, the combined bomber offensive played a crucial role in World War II, and we should consider its achievements when arguing that strategic bombing was

an RMA. The cost in aircraft and crews, however, suggests an unacceptable price that was largely the result of too many airmen accepting assumptions that past as well as present evidence suggested were substantially flawed.

The point is not to belittle the airmen of the interwar period. In fact this century is replete with military organizations that preferred to impose their peculiar models of war on conditions they confronted rather than learn from the past. To some extent all organizations will get certain things wrong about the next war; it has been the persistence of many military organizations to hold their course *despite* evidence to the contrary that is inexcusable. The two most obvious cases are the British army during World War I and the American military in Vietnam.

all organizations will get certain things wrong about the next war

How should we adjust to the next RMA? First, no revolution has ever involved a leap into the future without a lifeline to past military concepts and capabilities—particularly the recent past. We should not think that back to the future suggests anything other than a stab in the dark. Those military organizations that have created successful RMAs have tied development of the revolutions to a realistic understanding of the past. That attention to lessons learned has generally been carried over into an evidentiary-based analysis of current exercises and capabilities in peacetime as well as in war. This is not to say that organizations that have failed to use such an approach have failed to adapt to the conditions of a new RMA. The British army during World War I and the combined bomber offensive suggest that, given enough blood and treasure, even the most obdurate military organization will eventually learn, but that hardly suggests a path we should wish to retrace.

Secondly, we must not believe that new concepts or capabilities will negate the fundamental nature of war. Friction together with fog, ambiguity, chance, and uncertainty will dominate future battlefields as it has in the past. History certainly stresses that lesson, and for those who debunk history it is worth noting that various sciences—evolutionary biology, quantum physics, and most current mathematical research—emphasize that Clausewitz's basic understanding of how the world works was correct. Friction will not disappear in the next century; it is a fact of life.

Finally, although technology is important it is only a tool. If we connect it to a clear understanding of the past and present, we can perhaps push our current capabilities into the future in an intelligent fashion and thus be on the leading edge of the next RMA. If we jettison history by haphazardly leaping into an uncertain future, we may endure the same consequences as the airmen of World War II. In 1942 America had almost unlimited resources and the will to "pay almost any price and to bear any burden." Those conditions may well not obtain in the future. **JFQ**

NOTES

[1] The author acknowledges the participation of Cliff Rogers, Geoffrey Parker, John Lynn, Macgregor Knox, Dennis Schowalter, Holger Herwig, Jonathan Bailey, and Allan R. Millett at the RMA conference which was held at Quantico, Virginia, in April 1996.

[2] See among others the introduction by William A. Owens to *Dominant Battlespace Knowledge: The Winning Edge*, edited by Stuart E. Johnson and Martin C. Libicki (Washington: National Defense University Press, 1995), pp. 3–17.

[3] For the development of German armor doctrine, see Williamson Murray, "Innovation in Armored War, " in *Military Innovation in the Interwar Period*, edited by Williamson Murray and Allan R. Millett (Cambridge: Cambridge University Press, 1996).

[4] The following line of argument owes much to the historians who met at Quantico in April 1996, in particular Clifford Rogers and Holger Herwig.

[5] Carl von Clausewitz, *On War*, edited and translated by Michael Howard and Peter Paret (Princeton, N.J.: Princeton University Press, 1976), p. 592.

[6] Michael Howard, "The Use and Abuse of Military History," *Journal of the Royal United Service Institution*, vol. 107, no. 625 (February 1962) pp. 4–10.

[7] James S. Corum, *The Roots of Blitzkrieg: Hans von Seeckt and German Military Reform* (Lawrence, Kans.: University Press of Kansas, 1992), p. 37.

[8] Erich von Ludendorff, *Ludendorff's Own Story, August 1914–November 1918*, vol. 1 (New York: Harper and Brothers, 1919), p. 24.

[9] Quoted by Group Captain R.A. Mason in "The British Dimension," *Airpower and Warfare*, edited by Alfred F. Hurley and Robert C. Erhard (Washington: Government Printing Office, 1979), p. 32.