# WHY THE CIVIL WAR MIGHT NOT BE THE FIRST MODERN WAR

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The American Civil War (CW, 1861-1865) has its share of historical controversies, and many of them are still debated today. For Gettysburg, perennial favorites are General Jeb Stuart's ride and General Richard Ewell at Cemetery Hill. It is almost impossible to avoid these. In most cases, however, they involve little analysis, but indicate the speaker's preference for what he thinks should have happened. As a result, the arguments often involve crassly modifying history: for example, shortening Stuart's ride or beaming down *(a la Star Trek*) General Thomas Jackson right in front of Cemetery Hill on July 1, 1863. In the latter case, the argument ignores the inalterable fact that Jackson had been dead for two months. And so it goes.

However, some discussions do not involve modifying history, but they do involve analysis. Technical details are a common topic for analysis. For instance, it is possible to analyze rates of fire for Federal and Confederate artillery for a battle based on available records while offering no hypothetical change in the result of that battle. Whereas such analyses are not good fodder for barroom discussions of the CW, they do provide insight into reasons for a battle's outcome. A discussion topic of this sort is whether the CW was the first modern war, the last war of limited combat, or a transition between the two.

This paper will analyze the assertion of modernity for the CW by a number of its characteristics suggested to be "modern." Most such lists look "forward" from the CW and note *similarities* to future capabilities. For example, comparing CW balloons to World

War I (WW1) airplanes 50 years later might suggest that the CW was forward-looking. However, this paper uses a different tack, i.e., looking backward to the CW from a later war and comparing *differences* between capabilities between the two wars: in other words, looking back from, say, World War II (WW2), and listing capabilities that did not exist in the CW. For example, to whet the reader's appetite, one such WW2 characteristic is penicillin. This might shed a different light as to the supposed "modernity" of the CW.

To investigate the modernity of the CW, this paper will first discuss the idea of "modernity" and what it actually means throughout history. It will then inventory most of the major reasons supporting and contradicting this contention. It continues with a backwards comparison from the early 20th century toward the CW, listing characteristics whose existence had no hint in 1865. It will end with a short list of true CW innovations. The goal is not to state definitively whether the war is modern or not, but to offer a different way to approach the question.

Finally, this paper correlates actions and persons to those in other conflicts, a technique uncommon in CW historiography with the notable exceptions of the works of Fletcher Pratt and John Keegan. However, using such an approach can often help cast new light on relevant topics and explain them better than in isolation.

## WHAT IS MEANT BY "MODERN"?

It is safe to suggest that no previous civilization thought of itself as backward. Each civilization had its culture, society, technology, and method of food production. To itself, in its time, it was "modern." People lived and died in relatively stable cultures with little change between generations and little reason to dwell on the past or the future: for the

most part, life was difficult in any era and was short. Moreover, civilizations in 2000 B.C. (for example) did not look forward to a distant future when later civilizations would call them "ancient." Technical advances were slow. For example, the journey from the simple hoe in prehistoric times to the scratch plow to the moldboard plow, a far superior design, took about 6,000 or 7,000 years.[1] As a final thought, imagine for a moment transporting back 4,600 years ago and telling the anonymous designer of the Great Pyramid of Giza that he was "backward"…

By the same token, can any person today deny that mental giants of the past would not fit in well today with the faculty of the Massachusetts Institute of Technology or similar school? Or maybe even be Nobel Prize winners? The Great Pyramid's designer mastered not only the mathematics and engineering required to build such a structure, but also the administration and management of raw materials, scores of work sites, transport, and thousands of workers all over Egypt. The third century B.C. Greek mathematician and engineer Archimedes explored topics in mathematics, physics, astronomy, mechanics, and engineering. In an era centuries before algebra, he anticipated the infinitely small values germane to infinitesimal calculus (later invented independently and described in full by Sir Isaac Newton and Gottfried Leibnitz in the 1600s). Archimedes' treatise on floating bodies (buoyancy) is considered a scientific masterpiece, especially since he lived approximately 250 years B.C. Despite their accomplishments and advanced thinking, none of the individuals of these eras would be called "modern" today.

As with humans in previous centuries, CW participants considered themselves "modern": to be clear, that is 1860s' modern. Per Michael Collie on the Military History Online web site, "The idea of modern war is an imprecise term. Any war is modern for its

own time. The reference to 'modern war' is more reasonably meant to distinguish 20th century industrial-age war from previous periods."[2] Many technologies used between 1861 and 1865 did not exist on a large scale in the Mexican-American War (1846-8), where many of them saw combat: rifled cannon, telegraphs, railroads, photography, balloons, steam ships, ironclads, and anesthesia, to name a few. This would have indicated progress over the past, and rightly so.

The contrast between "the modern" and "the not modern" is perhaps no starker than at Gettysburg on July 1, 1863, when old townsman John Burns (69 or 70 years old) walked up to the 150th Pennsylvania Regiment of Infantry and offered to join it in fighting the rebels. Burns, a veteran of the War of 1812, was dressed in formal clothing of a style around 40 years old and armed with a similarly old musket. (This is roughly equivalent to a Spanish-American War veteran appearing in his uniform and gear at a WW2 training camp.) One can only imagine the thoughts of those young Pennsylvania officers and men, average age perhaps 25, viewing this old soldier (eccentric?) offering to fight. Yes, they considered themselves modern.

Starting in the late 1700s, the Industrial Revolution in Europe and the United States was a force in technology and social change. It is partly because of the predominance of northern industry, especially in manufacturing and railroads, that the Union eventually defeated the Confederacy. Consider this: by the 1870s, locomotives could reach speeds over 60 miles/hour, although most trains did not reach that on their normal routes. Therefore, these vehicles were the *fastest manmade* things on Earth, making their drivers, the locomotive engineers, the equivalent of today's jet fighter pilots. They considered themselves modern too.

It should be noted here that throughout history, stories and poems have been written about societal improvement or perfection in future societies. Sir Thomas More's *Utopia* (1516) is an early example of this and has given rise in literature to the idea of a perfect society. Jonathan Swift's *Gulliver's Travels* (1726) discussed "ideal," but different, societies around the world. By the mid-1800s, authors such as Jules Verne and H. G. Wells mixed adventure with future technologies in such works as Verne's *Twenty Thousand Leagues Under the Sea* (in 1869 predicting a futuristic submarine) and Wells' 1895 *The Time Machine*. The ideas and descriptions of future technology were not alien to the times, just not as universal as today.

However, by 1900 civilization was being transformed by new technologies such as electricity, internal combustion engines, airplanes, radios, telephones, X-rays, incandescent light bulbs, and so forth. This "modernism" had three major effects. One, it created an optimism in society that technology could solve any problem. Two, it quickened the pace of daily living, especially in transportation and communications. Three, it produced a sense of invincibility that nothing could stop the march of mankind.[3] (This optimism received severe blows after the sinking of the "unsinkable" RMS *Titanic* in 1912 and WW1's colossal destruction, but these are beyond the scope of this paper.) By the mid-1900s, the date itself became a milestone for accomplishment or frustration. For instance, statements such as this became common: "It's 1970—we can put a man on the moon, but we still can't cure the common cold." (The "common cold frustration" trope was even used in the many futuristic *Star Trek* television series, indicating that it resonated with the public in the 1960s and later.)

The question of the "modern" CW usually ignores the historiographic definitions of the modern era, but these are not standardized. For the purpose of this paper, a working definition (from the University of Minnesota Libraries website) is "A cultural period is a time marked by a particular way of understanding the world through culture and technology. Changes in cultural periods are marked by fundamental switches in the way people perceive and understand the world."[4] For European/American history, the Modern Era starts between 1400 and 1600, depending on the source, and extends to about 1950, which is considered the start of the Postmodern Age.[5] (The latter has no application to this paper and is mentioned here for completeness.) Based on this definition, the CW occurred in the Modern Era and could therefore be considered modern by default. This is the chronological framework for the topic in *The Oxford History of Modern War*: "Violent conflict is as old as humanity, but modern war is different. Somewhere between the sixteenth and eighteenth centuries an historic change took place in the military power of European states."[6] But this does not suffice to answer the real meaning of the question, which is "Is the Civil War closer to the Mexican-American War or WW1?

As stated above, the traditional way of determining CW modernity is to look forward from the CW toward its future and note similarities. This must be used carefully, in that a capability *introduced* in that conflict does not necessarily indicate modern usage or capability as we understand it. A good example here (again) is the balloon. Both sides used them for reconnaissance and both sides tethered them to barges, causing them to earn the designation "the first aircraft carriers." But the Union stopped using them in 1863 for a number of reasons; therefore, one must ask, does this qualify their use as "modern?" And balloons were used first for reconnaissance in France in 1794—how does that fit in?[7]

Also, an unstated question is just how many CW innovations are required for the war to be labeled "modern?" It appears that no criterion exists: all one need to do is list an unspecified number of innovations or introductions and declare unilaterally that "Based on all this innovation, the CW was the first modern war." It is subjective and anyone can do it; ergo, this paper may enter the fray with a different approach.

## CIVIL WAR CHARACTERISTICS UNDER ARGUMENT

As to the question of the Civil War's modernity, opinions on both sides abound. What follows are samples from a simple Google search on "Civil War modern war." The Virginia Museum of History and Culture states that "many of the essential elements of modern warfare were in place by 1865."[8] It lists these characteristics:

Text Messaging (telegraph)

Military Balloons (used on both sides)

Revolution at Sea (ironclads, especially USS *Monitor* and CSS *Virginia*)

War Rides the Rails (railroads)

Photography[9] [considered by this paper an adjunct to the war affecting the public, but having no tactical effect]

The Public Broadcasting System (PBS) History Detectives website notes that "some" historians call the CW the first modern war and lists these developments:

Telegraph

Aerial reconnaissance

Railroads

Army ambulance corps

Long-range weapons and the Minié Bullet

Coffee Mill Gun/Gatling Gun

Ironclad Warships

Naval mines and torpedoes[10]

Most of the lists resemble the two above with the additions of breech-loading weapons (rifles and cannons), trench warfare, and violence against civilians.

The opposite view (remember that these analyses are *opinions*) is that the CW was *not* the first modern war. The main arguments on this side fall into three groups:

1. The "modern" developments in the CW (listed above) were introductions or incremental advances and not quantum leaps in those technologies. A good example here is the machine gun, referring to its CW incarnations the Coffee Mill Gun and the Gatling Gun. It appeared during the war, but was not part of standard equipment as it would be in WW1.

2. Claims that the CW saw the "first" use of a certain technology often ignore advances made in Europe prior to 1861. One item here is the use of entrenchments. The Federal entrenchments around Vicksburg, Mississippi, and Richmond and Petersburg, both in Virginia, are often claimed to be precursors to WW1 trench warfare. But the use of trenches extends back to ancient times—Caesar's double entrenchment surrounding the Gauls at Alesia in 52 B.C. is offered as an example—and continued in Europe through WW1, which became famous for trench warfare. Other claims in this area involve the use of railroads and violence against civilians.

Another area where the term "first" is used involves ironclad warships. The United States was not the first country to build them: the French and British experimented with

and deployed ironclad barges mounting heavy guns for at least 10 or more years prior to 1861 (in the Crimean War), and these had to be towed to position. However, the first engagement *between* ironclads occurred in the CW, that between USS *Monitor* and CSS *Virginia* (neither was an ocean-going vessel) in March 1862.[11] Both sides continued to build ironclads, but the Union, with its greater industrial capacity, built far more than the Confederacy. Since other countries were also building such ships, it was inevitable that two of them would do battle sometime.

3. Features of the CW that did not change from previous wars, although they might have undergone some modification during the war. A prime candidate here is the Napoleonic infantry tactic of linear frontal assaults. It was modified slightly, but not frequently, during the war with the non-linear formations commanded by Union Colonel Emory Upton at Spotsylvania Court House, Virginia, and General James Longstreet at Chickamauga, Tennessee, and others, but most battles were fought using the standard linear tactics. Another characteristic with a long past is battlefield communications, which remained almost unchanged since Alexander the Great: voice, bugles, drums, couriers, and flags (including semaphores and codes).[12] Most of these methods had to be within earshot or eyeshot and almost none was instantaneous. Telegraphic battlefield communications were rare and not part of standard operating procedures.

The Britannica website takes a middle-of-the-road approach, calling it a "transitional war," but lists many of the same things:

> Some have called the American Civil War the last of the old-fashioned wars; others have termed it the first modern war. Actually, it was a transitional war, and it had a profound impact, technologically, on the development of modern weapons and techniques. There were many innovations. It was the first war in history in which ironclad warships clashed; the first in which the telegraph and railroad

> played significant roles; the first to use, extensively, rifled ordnance and shell guns and to introduce a machine gun (the Gatling gun); the first to have widespread newspaper coverage, voting by servicemen in the field in national elections, and photographic recordings; the first to organize medical care of troops systematically; and the first to use land and water mines and to employ a submarine that could sink a warship. It was also the first war in which armies widely employed aerial reconnaissance (by means of balloons).[13]

Britannica's approach is that the CW saw a number of "firsts," but is transitional because the inventions had more effects on later wars. In short, it was a prototype.

In summary, the decision on the modernity of the CW is not in yet. The reader should note that the three viewpoints above—modern, not modern, and transitional—all involve lists of items that appeared in the CW that continued later in more sophisticated form. The next section will balance this with a list of postbellum inventions that also had large impacts on war and society.

## OTHER DETERMINANTS OF MODERNITY

As written above, the traditional method of determining Civil War modernity is to start with inventions in that conflict and "look" forward toward their "modern" evolution. For example, the telegraph leads to the telephone, the radio (and battlefield communications), the television, and ultimately to the cell phone. The determination is then made as to whether its use in the CW goes into the Modern Column or the Not Modern column. This section takes the opposite tack, i.e., listing inventions made after the CW, and with *no* hint during that war, to see if their number is large enough to count the CW as modern or not. Understanding that there might be some overlap between the categories, the list follows.

1. Internal combustion engine. Perhaps no other postbellum invention is more characteristic of modern society than the gasoline-powered internal combustion engine in which fuel is consumed inside the engine to produce work. Invented before the CW and improved in the late 1800s, it impacted every aspect of society, including the military. With motorization, cars, trucks, tanks, and airplanes appeared on the battlefields of WW1. Yes, WW1 armies used horses in the hundreds of thousands, but motorized vehicles appeared in the thousands. In the CW, the only similar instrument was the steam engine, but this is an *external* combustion engine in which the fuel is combusted outside the engine. As is known from the history of the two types of engines, the internal combustion engine proved to be the more versatile design: indeed, a steam-powered airplane would be almost impossible to imagine today (although experiments were conducted in the 1800s). Inventions using internal combustion such as cars, trucks (and ambulances, see below), tanks, and aircraft have no foreshadowing in the CW.

2. Electrical systems. When one thinks of the surge of major engineering projects in the 19th century, ships, railroads, and bridges often come to mind and indeed they almost became symbols of engineering. However, equally important and extensive was the development of electrical systems during this period. The development of electrical power systems and the safe installation of electricity in American homes (with its attendant appliances) contributed to the benefit of society overall.

The telegraph system was the first electrical system in widespread use and it was well-established by 1861. Thus, its military use in the CW was a natural extension of its civilian use and not a military innovation. The use of the telegraph and the wigwag flag signal systems led to the establishment of the U.S. Army Signal Corps in 1860.[14] But in

1861, the full nature of electricity and magnetism was not fully understood, the telegraph being the first practical tool that could be built without deeper understanding of these two phenomena. This understanding did not occur until the 1860s in England when a Scottish mathematician, James Clerk Maxwell, published a paper demonstrating that light, electricity, and magnetism were different manifestations of the same phenomena. This unification of electricity and magnetism into "electromagnetism" (via the famous four "Maxwell's Equations" that torment undergraduate physics and engineering students to this day, including one of the authors a long time ago) ushered in the fields of modern physics and modern electrical engineering and led by 1917 to the development of vehicles, electrical grids, telephones, and radio. In fact, *all* modern electronic devices, today, from radars to cell phones to satellites to heart monitors and so forth, spring from these four equations.

Of course, along with electrical systems one must include the incandescent light bulb. This device had a long development history and entered large-scale commercial use long after the CW. By 1917, it was fairly well established in the United States and Europe. This too had a major impact on society in that night was no longer a limit to human activity. Relative to warfare the impact is enormous: supplies can move at night. Factories could produce equipment and materiel 24 hours/day, reading, study, and training could occur at night, and surgery could occur indoors (or in tents) under more sterile conditions (more on this below).

Which brings us back to battlefield communication. By WW1, some of the older methods still remained: voice, flags, and bugles, for example. Remember that in WW1 Corporal Adolf Hitler was a courier in his regiment. However, battlefield communications

were improved with the addition of radios and telephones. The ability to speak via telephone across the front line or to the rear instantaneously allowed better coordination, improved troop allocation, and more responsive artillery support when needed. Battlefield telegraphs in the CW could not come close to these capabilities.

3. Steel. The predominant building metal in the 1860s should be clear from the names "Iron Horse" (locomotive) and "Ironclad" (gunboats). The first train rails were also made of or plated with iron. Although steel, an alloy of iron and carbon, existed prior to 1861, it was expensive to produce and therefore found limited use. During the CW, although some warships were made of iron, most land and sea transport was wooden: armies of both sides were accompanied by *impedimenta* of animal-drawn wooden wagon trains up to 50 miles long. Cannon were made from iron or bronze, an alloy of copper and tin along with other metals.

Introduced in the mid-1800s, the Bessemer process allowed the economical mass-production of steel, which is stronger and more durable than iron. By 1900, steel train rails were common, ships were made of steel, and in 1906, the British Navy's HMS Dreadnought would define a new era of steel battleships. By WW1, steel was used in ships, vehicles, artillery, and tanks. The biggest threat to the common soldier in the later war was artillery, specifically because of two inventions with almost no foreshadowing in the CW.

4. Breech-loading weapons and hydraulic recoil mechanism. The crushing majority of CW infantry weapons were muzzle-loaders, which affected both infantry tactics and resulting casualties. Muzzle-loading muskets required the shooter to stand and attack in straight lines to mass fire. Breech-loading carbines were introduced for use by cavalry, but the number of these weapons was far less than the muzzle-loader for the

infantry. Breech-loading rifles did not require soldiers to stand while firing and allowed them to fire in the prone position offering them greater protection. They also allowed for infantry tactics depending on speed, movement, and cover and not marching in straight lines to concentrate firepower (the linear formations above). However, these improvements in tactics did not appear on a large scale in the CW because the great majority of soldiers were issued breech-loading muskets. (See the Smokeless Powder section below.)

Of the almost 6,000 cannons on both sides in the CW, almost all were muzzle-loaders, with only a handful being breech-loading Whitworth cannons made in England. Two of these are on display at the Peace Monument at Gettysburg. Although breech-loading cannons existed in the CW, they had no effect on the outcome of the war. For the majority muzzle loaders, the gun crew had an intricate multi-step process of positioning the gun, cleaning the tube with a snake and water, and then loading the powder, shell, and friction primer. After the gun was fired, the recoil (Newton's third law of motion) pushed the gun backward. The gun must then be repositioned and re-aimed; in fact, it must be re-aimed after each firing, which is horribly inefficient even for the best gun crew.

Loading a cannon in the breech is much more efficient than loading it in the muzzle. Good gun crews in 1863 could manage two shots/minute, but the gun still recoiled and required re-aiming. The French 75 millimeter field gun was developed in 1898 and could manage a rate of fire of around four rounds/min, with bursts up to 15 rounds/min. (Rates of fire are based on crew training and fatigue and temperature of the gun barrel.) It was not only breech loading that allowed it to attain these rates of fire, but another invention with no hint in the CW that appeared first in this weapon in 1898: the hydraulic recoil

mechanism. This mechanism, a piston similar to the automotive shock absorber, absorbs the energy from the recoil and returns the gun barrel to its original position without moving the gun carriage, allowing it to be loaded and fired again *without* repositioning and re-aiming as with CW cannon.

The combination of steel manufacturing, breech loading, and recoil management allowed artillery to proliferate during WW1, especially during the years of trench warfare. Unlike the CW, in which a few thousand cannons were produced on both sides, the combatants in WW1 produced thousands of cannons of all types and sizes. The CW had some impressive bombardments, such as Malvern Hill and Gettysburg, but these were mere fireworks displays compared to WW1 bombardments: for example, on the first day of the Battle of Verdun in February 1916, the Germans fired *one million shells* at the French. And on a sadder note, artillery accounted for 60% of combat wounds and deaths on both sides of No Man's Land.[15]

5. Smokeless powder. This one is not obvious to the casual observer. Invented in China in the 900s, gunpowder (called "Black powder" to distinguish it from modern smokeless powder) was the first explosive propellant. Ignition weapons until the late 1900s used black powder, which produced persistent, ambient clouds of smoke once firing started. This smoke obscured everything: flags and other visual cues, locations of troop formations, and even location of the enemy, important for aiming artillery. The one thing that the smoke did *not* obscure was the location of a shooter, rendering concealment useless and making it a bad day for a sniper. Black powder also tends to absorb moisture from the ambient air and clump, requiring frequent cleaning to avoid fowling and difficult loading. (The moisture in black powder can even rust the inside of the gun barrel over time.)

By the late 1800s, a new type of powder appeared that produced far less smoke from its chemical reaction, or "smokeless" powder. This powder not only burned cleaner, but was more powerful. It also absorbed less moisture, meaning that it did not erode gun barrels as fast.[16] (To be clear, smokeless powder does emit some smoke and foul gun barrels, but at a much lesser rate than black powder.) Per Alexander Rose's article "Clearing the Fog of War," it had a drastic effect on tactics:

> On the battlefield itself, smokeless powder helped destroy the old-world style of fighting. The vivid and distinctive uniforms of the previous era disappeared, along with such medieval relics as the glittering gorgets [collars to protect the neck], breastplates, and buckles that had for so long been the soldier's pride. In their place came dull khaki, gunmetal gray, and olive drab, all the better to camouflage soldiers now startlingly visible in smokeless terrain. The U.S. Army relegated its Revolutionary War–style dark blue to strictly formal use in 1902, and the British even abandoned their famous red coats for khaki.
>
> Despite the attention traditionally lavished by military historians on such 19th-century developments as the introduction of the rifle-musket, the relative decline of cavalry, and the rise of artillery, smokeless powder was clearly one of the signal influences on the transformation of warfare between 1865 and 1918. Indeed, as early as the Spanish-American War, the first conflict in which smokeless powder was deployed to any degree, the shock of the new order was already evident. The U.S. Army at the time was still largely dependent on traditional gunpowder, but a British correspondent noted that the Spaniards were using smokeless powder—and giving the Americans fits: "It was almost impossible to say exactly where some of their batteries were placed, for there was nothing but the flash to guide one, and that is a poor guide on a sunny day."[17]

(A clarification: In the Spanish American War in 1898, all of the U. S. Regular Army units were issued breech-loading rifles with smokeless powder, but not all of the Volunteer units received them.) In short, the CW tactic of straight line marches across open fields was gone. However, in WW1, line advances (not marching) across open fields was practiced throughout the war on both sides.

6. Powered aircraft. Although balloons had existed in Europe since the 1700s, it is easy to view military balloons in the CW as precursors to the future use of aircraft in war, but this is a false comparison. Balloons in 1862 foretold the use of balloons in 1917, but *not* powered aircraft, for which there was no hint in the CW. Of course, the generals in 1862 came to the same conclusion as they did in WW1: use balloons first for reconnaissance. In the CW, this was as far as it went with this type of aircraft because balloons were not used for offensive actions. Indeed, they were few in number, unpowered, tethered to the ground, and totally unsuited for offense. In addition, in the CW, there were no air battles with balloons and no special tactics developed for balloons. (They were shot at by the enemy from the ground, but again, this involved no special defensive balloon response.) In short, the appearance of balloons in the CW is a poor portend for later, powered, air combat with airplanes. (This does not include dirigibles or Zeppelins, which were *rigid* airships with an internal framework; balloons and blimps are *non-rigid* aircraft that maintain their shape from the overpressure of the contained gas.)

7. Modern medicine. Today, Civil War medicine is closely associated with battlefield surgery. Although the invention of anesthesia in the 1840s is correctly regarded as a breakthrough for modern medicine, it is only part of the story. In the 1800s, pus was considered a normal part of healing rather than a dangerous sign of sepsis that indicated infection, the leading cause of post-surgical deaths. Prior to anesthesia, almost all surgery was performed on external (visual) parts of the body to minimize pain for the patient. In the United Kingdom in the early 1800s (before anesthesia), surgeons were timed on the duration of their surgeries: top surgeons could amputate a leg in 30 seconds. Except for special cases like bladder stone removal (60 seconds, through the urethral canal), almost

no surgery was performed in the chest on internal organs. (This led to a differentiation among medical practitioners of the era: surgery and "internal medicine," a term that exists today.)[18]

Anesthesia was certainly a first step in making surgery humane and painless. After it was invented in the 1840s, it became widely used, but with a counterintuitive effect, as discussed by Dr. Lindsey Fitzharris in *The Butchering Art, Joseph Lister's Quest to Transform the Grisly World of Victorian Medicine*:

> As it turned out, the two decades immediately following the popularization of anesthesia saw surgical outcomes worsen. With their newfound confidence about operation without pain, surgeons became ever more willing to take up the knife, driving up the incidences of postoperative infection and shock. Operating theaters became filthier than ever as the number of surgeries increased. Surgeons still lacking an understanding of the causes of infection would operate on multiple patients in succession using the same unwashed instruments on each occasion. The more crowded the operating theater became, the less likely it was that even the most primitive sanitary precautions would be taken. Of those who went under the knife, many either died or never fully recovered and then spent the rest of their lives as invalids. This problem was universal.[19]

This was the state of surgery in America in 1861. Army surgeons operated in uniforms covered with bloody aprons and used bloody, unclean instruments. Anesthesia was plentiful in the army hospitals of both sides, but with no knowledge of germs or antiseptics thousands of soldiers died from post-operative infection.

Of course, in between battles, soldiers got sick. They suffered from a variety of ailments: colds, flu, measles, bronchitis, ear infections, indigestion, diarrhea, dysentery, rheumatism, and so forth. As for non-surgical medicine, the prevailing medical theory of disease since Ancient Greece was that of Humorism, which stated that one's health was governed by the balance of four bodily fluids, or humors. These were blood, phlegm, yellow bile, and black bile. After examination, physicians would decide how much fluid

was required to be drained to restore balance to the humors and therefore restore health to the patient. This was known as bloodletting and it was common—even George Washington underwent bloodletting shortly before he died. (Even today, the anatomical term for the fluid in the eye is "aqueous *humor*.") In addition, the Miasma Theory held that contagious diseases and infection were transmitted by poisonous vapors or "bad air" and not via human or other biological transmission. In fact, the word *malaria* comes from Italian and means "bad air." This was the state of medicine in 1861—no accepted germ theory of contagion and few effective treatments. It is important to remember that regardless of how crude or cruel medical knowledge and methods were during the CW (or in any historical period for that matter), medical practitioners of any era provided their patients with *the best possible care they knew how to give*. It is easy to lose sight of this.

Major improvements would come, but they would take another 40 years to become accepted in both the United States and England. The skill and tenacity of both Louis Pasteur (germ theory of disease) and Dr. Joseph Lister (antiseptic surgery) would be required to effect changes in both medicine and surgery. By 1900, operating rooms were clean and well-lighted (from electricity, above), instruments were sterilized, participants wore gowns and gloves, and what we know today as modern surgery began. Medical diagnosis and treatment were based on science (the germ theory) and ancient practices such as bloodletting stopped. Modern medical imaging began in 1895 when Dr. Wilhelm Röntgen produced X-rays and later used them to make photographic images of bones. All of this was standard medical practice by 1917, and none of it existed in 1865.

8. <u>Time zones.</u> Because the Earth is round and rotates on its axis, the apparent position of the sun at any location is always changing. This produces a local solar time for

each longitude and each town, so when it is local solar noon in Philadelphia, Pennsylvania, in Pittsburgh across the state it is about 11:40 a.m. local solar time. This time reckoning worked in Colonial times when travel was by horse or boat and slow, but became increasingly problematic when the telegraph and railroads started to expand across the country. Different rail companies and different towns maintained their own times and train schedules, causing complexity, confusion, and duplication. Even by the 1860s, when the transcontinental railroad was being built, this situation had not been corrected. It was not until the 1880s that standard time zones were established in the United States and Canada and it was not until the 1920s that most of the world conformed to standard worldwide time zones.

Why is this important to the CW? Because soldiers from all over the country were stationed all over the country and they moved all over the country. Timekeeping varied in different ways: some soldiers kept their clocks on the time of their hometowns, others changed their clocks to local time, and many didn't bother to keep any particular time as they marched from town to town. Railroads by 1860 had extended to Omaha, Nebraska and it is unknown how the lack of standard time affected the movement of men and supplies across the country even before 1861. In addition, the lack of standard time caused uncertainty in the timing of certain events. For example, exactly what time did General Winfield Scott Hancock arrive at Gettysburg on July 1, 1863, and exactly how long was the Confederate bombardment prior to Pickett's Charge on July 3? For these and other temporal questions, the best (and only) answer is normally a range of times.

## MODERN FIRSTS WITHOUT QUESTION

In discussing the question of the modernity of the Civil War, it is easy to get lost in forward and backward comparisons, but it is helpful to recognize that the conflict did produce at least three enduring innovations with no predecessors. These exceptions are presented here.

1. The U.S. Ambulance Corps. This often appears in lists of CW "firsts." Although the science of medicine made few advances in the CW (not enough to be called modern), the "science" of modern battlefield medicine was developed in the CW and continues to this day. At the start of the war, the collection of wounded after a battle was haphazard and woefully incomplete: many wounded soldiers lay suffering for days before receiving aid. As it progressed, the unexpectedly large numbers of casualties forced the need for specialized medical units, and this led to more organized methods of retrieving and caring for wounded. Ambulances corps were established in different Union armies to meet this situation: eventually, Congress created a permanent U.S. Ambulance Corps in 1864. These medical units were authorized to have purpose-built ambulances supplied with specialized medical equipment, such as water, stretchers, and medical supplies in special containers. In addition, these ambulances were manned by specially trained soldiers who tended to the wounded until they arrived at field hospitals.[20]

These advances were largely due to the knowledge, experience, ingenuity, and persistence of Dr. Jonathan Letterman, Major, U.S. Army. Starting as medical director of the Army of the Potomac in 1862, he reformed the system and methods of battlefield management. In addition to the changes commensurate with the Ambulance Corps, he set standards for army surgeons, instituted a triage system for sorting wounded, established

graduated tiers of medical care from field hospitals to permanent hospitals, set cleanliness standards for those hospitals, instituted sanitary engineering standards for army camps, and established better diets for soldiers to prevent diet-deficiency diseases such as scurvy. (Vitamins would not be discovered as essential nutrients until the early 1900s, but doctors had already established some associations of diet (or lack thereof) with disease.) Dr. Letterman's innovations continue today in both military and civilian medicine, although in much improved form (internal combustion, electrical communication, anesthesia, and antibiotics previously discussed), earning him the title of "The Father of Modern Battlefield Medicine."[21]

2. Rotating naval gun turret. The design of USS *Monitor* included a true innovation, the steam-powered rotating gun turret. This invention separated navigation and gun control for the first time and allowed a ship to provide a much greater arc of fire than stationary guns. This allowed fewer guns on a ship to provide equivalent coverage. At Hampton Roads, *Monitor* and its turret (with two guns) dueled with CSS *Virginia* (12 stationary guns on all four sides) for four hours ending in a draw. The influence of the turret on weapon design is undeniable, having been installed on ships, land vehicles (especially tanks), aircraft, and land fortifications. (There were other inventors in Europe who independently developed the naval turret, but its use in the first battle between metal ships is uniquely American, which is the domain of this paper.)

3. A single continental strategy for winning the war under a single commander. This is one modern invention from the CW that is rarely mentioned in CW modernity discussions, but has probably had a more far-reaching effect. To understand the inclusion of this item, it is important to understand the distances involved. Per Google, the distance

between Paris, France, and Moscow, Russia, is 1763 miles, and the distance between New York and Denver is 1627 miles, different by less than 100 miles. But the European distance crossed five countries in 1914 and American distance only one country in 1861 (and today). Taking the distance from Denver south to San Antonio as 930 miles, one produces a land area two to three times the land area of Europe. For this reason, the CW became much harder to manage than a contemporary normal war in Europe between two or three much smaller countries.

To manage this, the Union and the Confederacy were organized into military departments, such as the Confederate Department of Louisiana and the Federal Department of the Atlantic. Lieutenant Colonel Mark Boatner, III, USA in *The Civil War Dictionary*, provides a list of over 100 CW departments on both sides. Each of these departments had a military commander, who commanded its military forces.[22] Department commanders received permission to conduct operations against their opponents, but these operations usually had no relation to those elsewhere. For instance, the Confederate invasions of the North in Kentucky and Maryland in the Fall of 1862 had no relation to each other and no means to support each other. The Union Mississippi and Virginia Peninsula campaigns in 1862 were similarly independent and uncoordinated.

The Confederacy had no national strategy for winning the war. However, it had a strategy for *fighting* the war, which was to keep Federal armies out of the South until the Union populace tired of the fighting and the casualties, thus leading to the end of the war. The Union started the war with General Winfield Scott's Anaconda Plan, comprising three parts:

a. blockade Confederate ports.

b. occupy the Mississippi River valley to the Gulf of Mexico.

c. wait for Unionists in the South to convince the rebel government to sue for peace.

The final strategy fell along these general lines.[23] However, with no single army commander, implementation of this strategy was disjointed at best. Lincoln was of course the commander-in-chief of the army and navy, per the Constitution, but detailed strategy really belonged to a professional officer.

As the war progressed, it became clear that the Confederate government was not going to listen to Southern Unionists and that independent operations were not working on either side. It also became clear that the Union had to destroy Confederate armies to win. Finally, in March 1864, President Abraham Lincoln and Congress awarded the Lieutenant General (three-star) rank to Ulysses Grant, who was assigned to command all U.S. Army forces against the South. For the first time in the war, the army had a commander who outranked everyone else. Grant brought with him a single, coordinated strategy for conducting the war utilizing all the resources of the Union. (It is important to note here that Grant commanded only the army and *not* the navy. Although technically *not* under Grant's command, naval commanders cooperated with Grant as much as they could.)

The combined Federal campaign in May 1864 involved simultaneous invasions south toward Richmond, in the Shenandoah Valley, the James River east of Richmond, the Trans-Mississippi, and against Atlanta, Georgia. (The campaign in the Trans-Mississippi was planned and had started when Grant took command. Grant preferred that Union forces under General Nathaniel Banks (Department of the Gulf) move toward Mobile Bay, Alabama, but retained the campaign for political reasons.) The goal of Grant's strategy

was to attack the Confederacy at so many points that it could not shift forces from one invasion to another as it previously had done. Not all of the operations succeeded, but the combined effort led to the defeat of the Confederate armies and thus the Confederacy.

The United States was not a major player when it entered WW1 in April 1917, so it had to work within the strategy of the European allied commands; however, General John Pershing, Commander of the American Expeditionary Force, insisted on an American sector of the front to be under American command, enforcing the idea of a single American military commander. (This military concept today is called Unity of Command.) The theaters of World War II, of course, were global and very little tactical coordination could occur between operations in the Atlantic and Pacific Oceans. Strategic priorities were required, such as Germany First, and these priorities reduced, but did not eliminate, production conflicts between these two giant theaters, such as with landing craft. But these were still within the guidelines of a coherent American national strategy with single theater commanders, which had first been established and executed in 1864.

## SUMMARY AND CONCLUSIONS

Was the Civil War the first modern war? After many years of debate and scores of articles and book paragraphs, one paper cannot answer this question, and this paper has not tried to do so. It's premise is that whereas most arguments for the "first modern war" start in the CW and look forward for similarities to future capabilities, another way to judge the question is to start with a later war, such as WW1 and look backward toward the CW for differences. However, the quest to answer the question of the CW's modernity appears

to have no guidelines, at least none that appear obvious to the authors: because of this, it appears acceptable to offer another approach to make the argument, either pro or con.

Another characteristic of many discussions on the CW's modernity is the omission of why it matters. Every historical age was considered modern in its own time by its own human beings, many of their prominent figures were brilliant, such as Archimedes, and yet, none of them is considered modern. The CW was no different in its concept of itself. In fact, many soldiers in that conflict had fought in the Mexican-American War 15 years earlier and this would have served as a personal yardstick to gauge their 1860s equipment with that of the 1840s.

This paper then presented three lists of Civil War characteristics. The first list recapped the traditional grouping, such as the telegraph, balloons, and railroads, which are used to justify calling the CW the first modern war. The opposite opinion, i.e., the CW was not the first modern war, offers three arguments: CW developments were incremental advances that did not exist after the war, some CW "firsts" occurred in Europe prior to 1861, some CW features did not change from previous wars, but instead underwent some modification. A third approach is that the CW is a transitional war because the effects of its firsts were felt more in later wars.

The approach proposed in this paper starts at the first great war of the 20$^{th}$ century, WW1, takes stock of what makes it (20$^{th}$ century) modern, and looks back to determine if there was any hint of it in the CW. The top three items here (of eight, none of which existed in the CW) are the internal combustion engine, electrical systems, and steel. These three alone should indicate that there is some validity to the idea of looking backward. The rest of the list includes a mix of obvious items, such as modern medicine, and the obscure, such

as smokeless powder. Of course, this list is not comprehensive—indeed, no such list could be—, but it could serve as a start to a realistic accounting of what in the CW was really "modern."

In the compare and contrast of these characteristics, three stood out as being truly revolutionary and distinctly modern, thereby deserving special mention: the U.S. Ambulance Corps, the rotating naval gun turret, and a single continental strategy for winning the war under a single commander. None existed prior to 1861 anywhere (the U. S. or Europe) and all still exist today, although in much improved form. Whether these three items alone can justify calling the CW a modern war is anybody's guess. They simply stand out among all the others.

A final note. A certain historical event has been mentioned above in a supplementary role, but it requires full mention here: the Spanish-American War from April to December 1898. Discussions of Civil War modernity often ignore it, but if one "looks back" from WW1 to the CW, one must look through this event, as short as it was. This war does not include the complete list of modern characteristics associated with WW1, but it does display a few. By 1898, ships were made of steel and warships had rotating turrets (along with sponsons containing cannons along the sides of ships), breech-loading weapons were standard, and most army units had smokeless powder. Medicine in that war was much improved since 1865: infection was understood, operating rooms were sterilized, surgeons were clean, and swamps were drained to reduce diseases like yellow fever. Time zones were standard in the United States and almost standardized world-wide. Of course, anything involving internal combustion was not in general use in this war (cars, trucks, tanks, and airplanes), so its primary transport was horse- or mule-drawn.

This means that the traditional form of the question "Is the Civil War the first modern war?" might not be binary—yes or no. Because of the fast pace of technological innovation, from 1861 to 1918, it might be the start of a continuum with each war adding more characteristics to the list. However, this idea might be more complicated than it looks because of prominent wars fought elsewhere, such as the Franco-Prussian War (1870-1871) and the Russo-Japanese War (1904-1905).

As stated in the opening, the discussion (argument?) on the Civil War's modernity will not end with one paper and this paper offers no closing opinion. Even if the Civil War community could agree on the topic, it is an ethereal conclusion that simply adds minor understanding of the war itself. Instead, this paper offered only to propose an alternate, but legitimate, way to view the topic and to add to the discussion.

Let the discussion continue…

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Much of the historical information in this paper is of a general nature and can be found in most works on the subject; therefore, no footnotes are provided for these data. However, they do appear for quotes and for the more obscure items herein.

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