IGNORING THE OBVIOUS:

Combined Arms And Fire And Maneuver Tactics Prior To World War I

Major Thomas A. Bruno USMC

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Publisher's Note

Although in most cases we have retained the Author's original spelling and grammar to authentically reproduce the work of the Author and the original intent of such material, some additional notes and clarifications have been added for the modern reader's benefit.

We have also made every effort to include all maps and illustrations of the original edition the limitations of formatting do not allow of including larger maps, we will upload as many of these maps as possible.

IGNORING THE OBVIOUS: COMBINED ARMS AND FIRE & MANEUVER TACTICS PRIOR TO WORLD WAR I

by

Major Thomas A. Bruno, United States Marine Corps

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Thesis

Fairly or unfairly, the stalemate on the First World War's Western Front is often attributed to the intellectual stagnation of the era's military officers. This paper traces the development (or absence of development) of combined arms and *fire & maneuver* tactics and doctrine in the period prior to WW I, focusing on the Russo-Japanese War.

Discussion

The Western armies that entered the Great War seemingly ignored many of the hard-learned lessons and observations of pre-war conflicts. Though World War I armies were later credited with developing revolutionary wartime tactical-level advances, many scholars claim that this phase of tactical evolution followed an earlier period of intellectual stagnation that resulted in the stalemate on the war's Western Front. This stalemate, they claim, could have been avoided by heeding the admonitions of pre-war conflicts and incorporating the burgeoning effects of technology into military tactics and doctrine. Some go even further and fault the military leadership with incompetence and foolishness for not adapting to the requirements of modern war.

The Russo-Japanese War showed the necessity for combined arms techniques and *fire and maneuver* tactics on the modern battlefield. Specifically, the war showed the need for: (1) the adoption of dispersed, irregular (non-linear) formations; (2) the employment of *fire and maneuver* techniques and small unit-tactics, including *base of fire* techniques; (3) the transition to indirect-fire artillery support to ensure the survivability of the batteries, and; (4) the necessity for combined arms tactics to increase the survivability of assaulting infantry and compensate for the dispersion of infantry firepower.

However, deeply ingrained concerns over the loss of control on the battlefield and faith in the ability of morale to overcome firepower prevented the full realization of advanced combined arms techniques and *fire and maneuver* tactics. Instead, the lessons of the Russo-Japanese War were disregarded or minimized.

Conclusions

Military leaders did not ignore the lessons of the Russo-Japanese War. In fact, the ramifications of increased firepower and rudimentary techniques of *fire and maneuver* tactics were addressed in most nations' pre-World War I doctrine. Unfortunately, these concepts were not fully developed or practiced due to a failure to recognize a change to the fundamental nature of warfare itself. Massive firepower necessitated a new system of warfare. To effect this type of transformation, the entire military culture—equipment, doctrine, organization, and leadership— would have to evolve. Lamentably, the hard-earned lessons of the Boer and Russo-Japanese Wars had not prompted such a reformation. It would take the cataclysm of the First World War to act as a catalyst for this transformation.

In summary, most military officers recognized the lethality of modern weaponry prior to the First World War but consciously decided that offensive spirit and morale could overwhelm firepower.

"… bullets quickly write new tactics."[1]—Lieutenant General Wilhelm Balck, 1922

"Our long garrison life has spoiled us, and effeminacy and desire for and love of pleasure, have weakened our military virtues. The entire nation must pass through the School of Misfortune, and we shall either die in the crises, or a better condition will be created, after we have suffered bitter misery, and after our bones have decayed."[2]—Field Marshal von Gneisenau, 1806

"I am not at all interested in that silly nonsense you have shown me. Crawling around, taking cover, camouflage and indirect-fire: I don't understand these things and don't care a dime. I'd like to see a dashing regiment, galopping [sic] onto the battlefield, taking up positions and firing quickly!"[3]—Field Marshal Carl Tersztyansky de Nados, 1911

I. INTRODUCTION

"The horrors of the First World War—the machine guns, trench tactics, barbed wire and pounding artillery—came as a ghastly surprise to the generals. Yet they should, and could, have known better. In 1904 Japan and Russia had gone to war for dominance of the East. Journalists and military attaches had made meticulous observations, but the lessons of this dramatic conflict were dismissed as irrelevant."[4]

Nearly every historical study of the First World War contains a commentary alluding to the effects of increased firepower and technology on the nature of warfare. In 1922, German General Wilhelm Balck wrote, "Bullets quickly write new tactics."[5] However, most historical analyses of World War I would have the reader believe that the pre-war era did not bear out his adage. The Western armies that entered the Great War seemingly ignored many of the hard-learned lessons and observations of pre-war conflicts. Though World War I armies were later credited with developing revolutionary wartime tactical-level advances,[6] many scholars claim that this phase of tactical evolution followed an earlier period of intellectual stagnation that resulted in the stalemate on the war's Western Front. This stalemate, they claim, could have been avoided by heeding the admonitions of pre-war conflicts and incorporating the burgeoning effects of technology into military tactics and doctrine. Some go even further and fault the military leadership with incompetence and foolishness for not adapting to the requirements of modern war.

As early as the American Civil War (1861-1865) several indicators warned that the nature of warfare was changing due to the developments of new technology. The Wars of German Unification (1864-71)[7], especially the Franco-Prussian War (1870-71), confirmed that the face of warfare had transformed sufficiently to require new tactics and doctrine. Though some reforms were implemented, the fundamentals of Napoleonic battle were still commonly practiced.[8] Later, lessons derived from the Anglo-Boer War (1899-1902) and Russo-Japanese War (1904-5), caused several military organizations to enact further reforms. These later conflicts demonstrated the devastating effect of increased firepower. Both wars witnessed the evolution of decentralized small-unit infantry tactics, rudimentary *fire and maneuver* methods, and basic combined arms techniques—with small groups of soldiers led by junior officers and NCOs, advancing in irregular formations under the cover of closely coordinated artillery cover— to overcome the lethality of the modern battlefield.

The most basic change required was the evolution of infantry doctrine beyond the traditional usage of skirmish line tactics. Dispersion, decentralization, and small-unit maneuver were necessary for attacking infantry to advance through the enemy defensive

zone. Yet, at the outset of the World War, it was not uncommon for both the Allied and Central Power armies to employ dense, close-order attack columns.[9] [10]

Even prior to the First World War, the Russo-Japanese War demonstrated the need for a firepower 'solution' to the problem of covering the infantry as it advanced across the fire-swept defensive zone. Now more than ever before, organic and supporting fires were critical to suppressing enemy defensive firepower during the infantry advance. Specifically, the Boer and Manchurian conflicts witnessed the development of basic *fire and maneuver* techniques by employing *position infantry*— acting as an embryonic *base of fire—to* support the maneuver of infantry attacks. In the years prior to World War I, several nations directed the employment of *position infantry* in their tactical doctrines. In later years, the German army would expand small-unit decentralization and *base of fire* concepts into an advanced *fire and maneuver* tactical system.

Artillery support was also needed to provide accurate fires to cover the maneuver of dispersed attacking units. This coordination was made more difficult by the war's transition from direct to indirect-fire artillery support. The dispersion of artillery batteries and increased distance from the frontlines, combined with the era's primitive communications technology, made the facilitation of combined arms and *massed fires* more difficult. Although most nations attempted to ameliorate the situation by establishing a system of forward observers with special communications and signaling techniques, the majority of combined arms coordination issues would remain unsolved until after the outbreak of World War I.

The overall solution to crossing the fire-swept zone would demand more than merely modifying of infantry tactics and artillery firing techniques alluded to above. Specifically, it would require precise coordination between the artillery and infantry arms—namely, combined arms. Artillery fires were critical in suppressing enemy defensive fires during the infantry advance. Additionally, supporting fires were necessary to compensate for the dilution of firepower resulting from the dispersion of infantry formations.

Several observers noted the aforementioned implications of modern war. Several of these observations were codified into written military doctrine. Unfortunately, it would take the catastrophic losses of the First World War's early campaigns to act as a catalyst for substantive change in military doctrine *and* tactics. Apparently, observations involving the application of advanced warfighting techniques to overcome the effects of firepower were not fully heeded prior to the outbreak of the Great War. The lessons of this oversight remain applicable to modern military institutions—the ability to recognize the

implications of technology on warfare and the need for tactical and doctrinal transformation remains critical to present-day military officers. Accordingly, studying the reaction of pre-World War I armies to the developments of the Russo-Japanese and Boer Wars remains cogent to contemporary military organizations.

II. BACKGROUND: TECHNOLOGY, TACTICS, AND THE CHANGING NATURE OF WAR

The nineteenth century witnessed several phases of technological advancement. The first phase of technological progress occurred in the mid-nineteenth century and saw drastic improvements in the effectiveness of weaponry, transportation, and communications. Scholars cite the advent of rifled weapons, breech-loading armament, railroads, and the telegraph as examples of new technology available on the battlefield.[11] Accordingly, many historians describe the American Civil War as the first major war in the Industrial Age.[12] These innovations had profound effects on the Napoleonic tactics still being practiced by most military organizations. Increased firepower resulted in the expansion of skirmisher tactics and an emphasis on flanking maneuvers. However, most armies stubbornly clung to close-order tactics as the primary battle formation in the post-war years.[13]

A second phase of technology surfaced in the late nineteenth century. This period brought about military advances that perfected the earlier innovations of the century. Inventions such as magazine-fed repeating rifles, quick-firing artillery, machineguns, and smokeless powder, combined to further increase the lethality of firepower.[14] Some military observers believed that the ramifications of the magazine-rifle's flat trajectory, smokeless powder, and quick-firing artillery had a greater impact than the previous emergence of the breechloader. Specifically, the use of smokeless powder and the magazine-rifle extended the zone of lethal fire from 500 yards (of the previous breechloaders) to 900 yards in front of the defensive line. Combined with the higher rates of fire, it made this area "practically impassible." Direct, frontal attacks against entrenched troops were now considered "suicidal" by some officers.[15]

The combined effects of these military advances made offensive attacks risky and further strengthened the advantages of a defensive military posture. The requirement for proficient staff planning became absolutely essential due to the devastating effects of defensive firepower. Staffs were necessary to ensure coordination between the different service arms within the army. Although most military organizations were slow to recognize the importance of *combined arms*—the complete coordination of all service arms and support organizations—the concept was to become essential to modern warfare.[16]

By studying the American Civil War and the Wars of German Unification, some officers had identified the tactical implications of the first phase of the Industrial Age. These conflicts highlighted the lethal effects of the rifled-musket and breechloader and signaled the end for antiquated close-order tactics. Later, the Anglo-Boer War and the Russo-Japanese War demonstrated the necessity of combined arms due to the enhancements of the second phase of technology. The tactical lessons of the South African and Russo-Japanese Wars should have established the requirement for combined arms to support modern infantry attacks.[17]

III. A BAPTISM BY FIREPOWER:

III-A. The Russo-Japanese War (1904-05)—Infantry Tactics

The Russo-Japanese War has often been described as a prelude to the trench warfare of the First World War. The battlefields of the Manchurian campaign were strikingly similar to those of the First World War's Western Front. For the first time in the modern era, opposing trench lines were constructed—fortified with barbed wire, machineguns, minefields, and massive artillery formations. For instance, the Battles on the Sha-ho saw trench lines that stretched for 200 miles, separated in some areas by mere yards.[18] World War I *stormtroopers* would later operate in similar surroundings.

Both Russia and Japan entered the war with traditional military doctrine and tactics. The Russian army's doctrine was based on the venerable principles of Dragomirow—employing dense skirmish lines to maintain a high volume of fire. The Russian army utilized dense formations to achieve firepower superiority and the shock effect of the final bayonet charge. Both nations had yet to fully incorporate the lessons of the Boer War—namely, the importance of massed fires combined with the dispersion of manpower. In the case of Russia, even the basic lessons of the Franco-Prussian War had yet to be instituted.[19] The Japanese, mentored by German army officers, possessed a more flexible command system than their Russian adversaries. The Japanese army adopted the German principle of *Auftragstaktik*,[20] which contributed to their ability to rapidly adapt to the effects of the modern battlefield.[21] Successful Japanese infantry tactics developed during the Russo-Japanese War underscored the fact that modern combat now depended upon an army's ability to "clearly [act] according to circumstances, without regulation formations, and without official basis."[22]

The harsh reality of modern firepower would force progressive thinking military officers to devise the tactical innovations mentioned previously—irregular, dispersed infantry tactics, rudimentary *base of fire* tactics, combined arms tactics, and the coordination of indirect-fire artillery support with infantry maneuver. In order to penetrate the fire-swept battle zone, both nations would be forced to modify their tactics (albeit more slowly for the Russians) to compensate for enemy firepower. Though both nations modified their tactics during the war, the Japanese army's flexible command and control doctrine must be credited with allowing them to adapt to modern war more rapidly than the Russians. By war's end, the Japanese had adopted revolutionary tactics employing

small groups of soldiers in irregular formations—crawling, running, and rushing across the battlefield—to take fortified enemy positions. Though less frequently observed, rudimentary infantry *base of fire* techniques were also devised to support infantry maneuver. Beyond adopting irregular, dispersed formations, Japanese assaults were now closely coordinated with artillery covering fire, precisely timed to support the infantry maneuver element.

The most basic tactical evolution necessary to counter the increased firepower of the modern battlefield was the dispersion of infantry formations. Unfortunately, Russian pre-war doctrine was founded in shock tactics and bayonet charges rather than the concentration of firepower. To achieve a density of firepower and shock effect, formations with narrow frontages were commonly employed. Units arrayed in close-order were (theoretically) expected to overwhelm the enemy.[23] [24] Early in the conflict, German observers noted the Russian reliance on close-order shock action, rather than fire superiority, to be decisive in battle:

> "Instead of insisting upon a thorough individual training of the men for fire action, strict education in fire discipline, and proper warlike practice in directing fire action and in handling troops, the Russian regulations expected success from obsolete shock tactics without sufficient use of skirmishers and without enough preparation by fire."[25]

In actuality, Russian written doctrine espoused the employment of extended-order skirmisher formations, but their application was generally ignored due to perceived difficulties in command.[26]

The effects of technology had greatly extended the ranges of most weapons. Consequently, it was commonplace for artillery to engage targets as far as 6,000 to 7,000 yards. This occurrence had several implications for attacking infantry. Now, even rear areas were susceptible to enemy long-range artillery fire, especially in observable terrain. Tactical necessity forced Russian troops to deploy early into *chain* (skirmisher) formations, especially when in open terrain within range of enemy artillery. (It became a general rule to deploy companies into skirmish lines at ranges as far as 3,500 yards, but no farther than 2,300 yards from the enemy). Due to the accuracy of Japanese artillery, close-order movement in observed terrain became "absolutely impossible." Heavy rifle fire restricted the maneuver of dense infantry formations. Whereas Russian infantry regulations stated that the range of effective rifle fire began at 1,000 to 1,400 yards from the enemy, the lethal effects of Japanese rifle fire extended to ranges over 2,300 yards. Inside of 1,100 yards, rifle fire became withering. (One source estimated that Japanese rifle fire caused eighty-five percent of Russian combat losses during the Manchurian campaign).[27]

Eventually, high rates of accurate rifle fire forced the Russians to modify their infantry tactics. Often, entire battalions, not only companies, deployed into skirmisher formations. However, Russian tactics remained reliant on dense intervals to maintain high rates of fire in the attack. Russian officers preferred to put all available men into the firing line. At the small-unit level, the Russians believed that infantry reserves were of minimal importance since they often incurred casualties during the advance without contributing to the firepower of the unit. Thus, all available men were deemed necessary to bolster the firing line. As a result, company reserves were not regularly maintained, leaving regimental reserves as the lowest level of tactical reinforcement.[28]

Ideally, Russian skirmish lines advanced at a run, taking maximum advantage of terrain. Russian regulations stated that the firing line should rapidly advance to final firing positions (located approximately 300-500 paces from the enemy lines) to form for a bayonet attack. Though Russian officers still believed firmly that the bayonet charge remained the final decisive action of infantry combat, they also realized that to be successful final firing positions needed to be much closer to the enemy lines than stipulated in the regulations. As a result, the final firing position prior to the bayonet charge was usually located in a covered area in close proximity to the enemy lines. Sometimes this distance was a mere fifteen to twenty paces from the enemy position. At longer distances, the bayonet charge usually resulted in failure and excessive casualties. [29] Thus, infantry necessarily relied upon a combination of *fire and movement* and firepower (organic and supporting) to support the advance to their final attack positions. But, because the final bayonet charge would be virtually unsupported by fires, its distance had to be necessarily shortened.

Nevertheless, most Russian officers doubted claims that positions could be taken by fire alone, and still believed that the bayonet attack remained the decisive method to overtake an enemy position.[30] The experiences in Manchuria confirmed the Russian's faith in bayonet charges to overwhelm the enemy and solidify the morale of friendly soldiers.[31] (Prior to the Russo-Japanese war, some military thinkers correctly theorized that the increased accuracy, range, and rate of fire had made the bayonet charge unnecessary. However, during the Russo-Japanese War, most military observers noted that bayonet charges, in both day and night attacks, were often employed to carry the final decisive battle action).[32]

Notwithstanding, the Russians seemed to adapt more slowly to the ramifications of modern war. During the Russian attack on Mo-tien Ling (17 July 1904) the troops of the

10th and 24th East Siberian Regiments were formed in close-order formations to advance on the Japanese defensive positions. The Japanese capitalized on the vulnerable target and halted the advance.[33] As late as the attack on Wu-chang-ying and Chaing-liang-pu (14 October 1904), two regiments of the Russian 6th Siberian Corps attacked in antiquated close-order formations. Amazingly, the battalions were formed up and inspected in parade fashion, in full view of the waiting Japanese garrison. The formation marched at quick-time without any extension of the ranks. Outside of seven hundred yards from the Japanese position the Russians formed into a single battle line and continued the advance, as if on parade. The Japanese defenders easily repulsed the exposed infantrymen, taking a heavy toll of Russian casualties. After the failure of the first attempt, two battalions of the Russian brigade reserves attacked in the same fashion. The follow-on attack met the same fate as the first, (with one regiment alone losing nearly 2,000 men).[34] Amazingly, one of the same regiments had attacked a strong Japanese position using the same outdated tactics only two days earlier (on 12 October). The 219th Yukhnov Regiment attacked a position occupied by six Japanese infantry battalions and supported by eleven artillery batteries. At 600 yards, the Japanese opened fire with several thousand rifles and sixty-six guns, decimating the Russian regiment. The Yukhnov Regiment lost twenty-two officers and 832 men, a quarter of its strength, in mere minutes. As a result of its horrendous losses in the two aforementioned battles, the regiment was rendered combat ineffective.[35]

The Russians did, on occasion, successfully employ irregular infantry tactics, though less frequently than the Japanese. On their attack on One Tree Hill (16 October 1904), Russian batteries disregarded the Japanese artillery and focused on enemy infantry positions. Russian infantry advanced to the base of the Japanese-held hill in groups of four to five men. The infantry regrouped in the dead area at the foot of the hill and conducted a successful attack. Though their advance was later checked, the tactical execution of their assault was successful. Additionally, the Russian tactics demonstrated both the effectiveness of concentrating artillery fire on enemy infantry (rather than artillery) during an attack, and the usefulness of small-unit maneuver under fire.[36]

Heavy losses at the outset of the war also caused the Japanese to alter their infantry tactics. Early on, they abandoned European-style drill book maneuvers in favor of stealthy advances and infantry rushes.[37] The Japanese quickly realized that fire superiority, not shock power, was the key to modern infantry attacks.[38] Japanese infantry were initially formed in dense skirmish lines (with an interval of one pace) to achieve a heavy concentration of fire. Demonstrating basic *fire and movement* tactics, the infantry advance

was conducted by a series of rushes. Platoon-sized units *(zugs*), from the flanks of the skirmish line, normally executed the initial rushes. The remaining two platoons provided covering fire during the movement. The alternating rushes were designed to advance the line forward in sections, with two-thirds of the unit engaging in covering fire during the advance. [39]

The length of each rush depended on the terrain and tactical situation, especially enemy fire. At each successive position, the Japanese soldiers constructed hasty entrenchments in the prone position to shield them from enemy fire. In order to reduce casualties at closer ranges, individual soldiers, located near the enemy flanks, normally executed the final advance. If the enemy's front was narrow, the doctrinal reaction was to maneuver to flank the position while a pinning force attacked frontally. When attacking broad frontages, the Japanese attempted to pierce the enemy line.[40]

If the firing line encountered severe fire, they would often halt the advance, entrench, and await reinforcement. Supports followed the advancing skirmish lines at ranges of 100 to 150 meters behind the skirmish line. When the advance recommenced, the remaining supports would trace the firing line, making use of the hasty field works previously constructed by the skirmishers. If necessary, the skirmish line would conduct additional series of hasty trench lines during their advance in order to maintain their positions. As the skirmish line conducted its successive rushes, supports would occupy their abandoned trench lines. Likewise, reserves occupied the positions last vacated by the supports. The advance continued in this manner until the enemy position was overrun.[41]

One Russian defensive tactic was to allow the Japanese to approach within 100 to 200 paces and then discharge a lethal, concentrated volley-fire.[42] Often, this was when the Japanese advance stalled and needed reinforcement. Correspondingly, the Japanese devised a defensive tactic of falling back from their prepared positions to repulse Russian attacks. During the Russians' final charge, Japanese soldiers would then fire on the advancing enemy soldiers while they negotiated their abandoned trench line.[43]

To compensate for the high losses sustained by attacks, the inducement to conduct night attacks increased.[44] The Japanese made extensive use of night attacks, especially to compensate for the vulnerability of attacking over open terrain. The attack normally commenced with an artillery bombardment, followed by a pre-dawn assault. Several feints preceded the main attack to deceive the enemy of the main objective and cause him to commit his reserves.[45]

In the first major land action of the war, the Battle of the Yalu (1 May 1904), it became

obvious that traditional, linear infantry tactics were obsolete. Initially, the Japanese advanced in extended-order (with a 1-2 pace interval in accordance with their regulations —later in the war, they would extend the interval to as much as five yards, depending on the battlefield situation). However, Russian infantry replied with rifle volley-fire as the skirmish line approached 1,500 to 1,200 paces, causing the Japanese advance to lose its organization. Although highly disorganized, the Japanese infantry pressed the advance and succeeded in forcing the Russians from their trench lines. The Japanese overall attack was extremely successful and resulted in a Russian retreat.[46][47] Although the Battle of the Yalu was a Japanese success, their high losses demonstrated that rigid, linear tactics would no longer be practicable.

The Japanese quickly modified their tactics in reaction to heavy losses by employing extended-order and irregular formations. For example, during the Japanese advance on Chiao-tou (July 1904, prior to the above engagement), the soldiers of the 23rd Brigade moved forward in extended-order formation, with small sections of ten men or less rushing forward.[48] By the time of their initial engagements near Liaoyang (30 August 1904), the Japanese infantry were observed crawling behind high-growing crops *(kao-liang)* to conceal their movements. During an attack on Hill 1030, units advanced using company rushes of 100-yard intervals.[49] As the Manchurian campaign matured, the devastating effects of firepower became even more apparent. Dispersion and irregular formations became a common characteristic of Japanese assault tactics. For example, in the attacks to recapture Yen-tao-niu-lu (12 October 1904) the Japanese could not maneuver across the bullet-swept fields, even using section rushes. The infantry reverted to crossing the danger area in groups of two's and three's.[50]

General Sir Ian Hamilton, a British observer, later described the innovative tactics utilized by the Japanese on an assault at Temple Hill (11 October 1904, during the battles on the Sha-ho). His commentary was an accurate description of the Japanese proclivity to disregard traditional formations in favor of aggressive fire and movement tactics:

> "At the first glance it seemed as if there was no order or arrangement in this charge of a brigade over 500 or 600 yards of open plough. But suddenly I realised [British spelling] that it was not chance but skill which had distributed the pawns so evenly over the chess board [sic]. The crowd, apparently so irregular and loosely knit together, consisted of great numbers of sections and half-sections and groups working independently, but holding well together, each in one little line under its own officer or non-commissioned officer. There was no regular interval … inasmuch as the formation was not solid but exceedingly flexible and loose, offering no very valuable target even to a machine gun."[51]

General Hamilton's observations noted the rapidly executed attacks of Japanese General Okasaki's 15th Brigade. Okasaki's infantry assault (described above) charged

through a 600-yard open field directly in front of Russian positions. Three successive skirmish lines were formed with approximately a three pace interval between men. The lines charged aggressively without regard for maintaining alignment or formation. The amazing speed of the advance was credited with quickly overwhelming the Russian defenders and demonstrated the willingness of the Japanese to employ dispersed, irregular formations.[52]

General Okasaki executed the same type of attack the next day. During an attack on the heights of Orr-wa the next morning (12 October 1904), he once again ordered a rapid charge across another 600-yard field in front of the Russian positions. Once again, the Japanese infantry overwhelmed the Russian defenders. On both occasions, observers noted that the attackers halted infrequently during their charges.[53] [54] The German *Official History* offered a testament to Okasaki's tactics at Temple Hill stating, "Nowhere on the field of attack were column formations seen which would have offered favourable targets to the Russian artillery on the flanks."[55] [British translator's spelling]

The aforementioned tactics show a shift to small-unit, irregular formations (and the utilization of combined arms to enable their advance). However, when in open terrain facing lightly fortified positions, the Japanese reverted to doctrinal skirmisher-line tactics. At Chaohuatun, (in a battle that precipitated the Russian retreat from Mukden), the Japanese formed into skirmish lines with an interval of only one pace. Japanese artillery supported the battle by commencing counter-battery fire prior to the infantry attack. The artillery also targeted the Russian lines. From 13:45 to 18:55 the Japanese infantry slowly advanced under the cover of artillery fire from its initial positions located only 600 yards from the Russian lines. The skirmish line advanced, by a series of 50 to 100 yard-long rushes, constructing hasty trenches at each successive position. It was noted by observers that most of the Japanese casualties were received during the long halts at the hasty trench lines (by enemy rifle and artillery fire). Only small numbers of men fell during the actual rushes. During the infantry advance, the Japanese artillery maintained a high rate of fire, focusing on the Russian lines. The batteries also echeloned forward to maximize its support. As the friendly infantry approached 150 yards of the enemy lines, the Japanese batteries shifted their fire to the Russian rear areas.[56]

Once again, the close coordination resulting from combined arms effects contributed to the Japanese success. Concentration of fires at the correct time and place supported the infantry assault. Arguably, the combined arms interaction facilitated the Japanese success even though the infantry employed conventional, linear skirmisher tactics. U.S. military

observers reported that:

"… the war was conducted by both sides along strictly orthodox lines. The formation of the infantry for the attack, the massing of the guns, and the concentration of their fire, the value of field fortifications, the siege of permanently fortified localities, and so many other features, all savor strongly of the text-book … the recognized rules and principles for conducting warfare underwent no serious modifications in their application."[57]

Though the observer noted the proficiency of the Japanese at modern war, he missed one crucial observation. The Japanese had not merely mastered the already existing doctrine of modern warfare. Japanese infantry assaults, at times, displayed the rudiments of combined arms attacks that would become a pillar of future tactical doctrines. Additionally, although the Japanese only rarely exhibited true *fire and maneuver* infantry tactics, they saw the necessity under specific circumstances, to disregard doctrinal skirmisher formations and employ irregular formations consisting of small groups of men.

Apparently, the Japanese infantry's return to the skirmish line formations on the open terrain surrounding Mukden skewed military observations. Unfortunately, the U.S. observer's report missed the points that were to become the main lessons of the Manchurian conflict, stating:

"The great dispersion which was threatened by the lessons of the Boer war found no application in Japanese tactics. The intervals in the firing line were kept at a pace or pace and a half, a rather close formation theoretically, for modern weapons, but giving a volume of fire sufficient to cope with that of the defense. The Japanese showed that the frontal attacks by infantry over open ground are still feasible when made by good troops, well handled, and supported by an adequate artillery fire."[58]

However, this commentary is not entirely accurate. While the observation correctly assesses some of the requirements to conduct a successful attack, it does not credit the Japanese tactics for the adaptations they displayed in many of the aforementioned examples. In several cases, the Japanese were forced to abandon contemporary tactics in search of increased dispersion. In these instances, the Japanese tactics seemed remarkably similar to the tactics eventually devised by the British during the Boer War. Even more importantly, these same principles of combined arms and *fire and maneuver* would later serve as the foundation of German small-unit *stormtroop* tactics of World War I.

The success of improvised infantry tactics did have an impact on post-war doctrine. However, pre-First World War doctrine remained trapped in a transitional stage between full acceptance of dispersed *fire-tactics*—dependent on firepower, combined arms, and small-unit maneuver—and the desire to maintain the control of traditional linear-based tactics. In an effort to maintain a superiority of fire, American regulations showed a marked increase in the attention given to the coordination of supporting arms and *base of fire* techniques. However, dense skirmish lines were wrongly preserved in an effort to

achieve a concentration of rifle fire.

For example, the fledgling *fire and maneuver* tactics listed in the American *Field Service Regulations, 1913 (FSR, 1913*) contained incompatible guidance. The *FSR* directed that gaining a superiority of fire required "the placing of as many rifles as possible on the firing line …" Accordingly, the regulations directed that thin skirmisher lines be formed in sections assigned supporting attacks. However, the main effort was to be carried out by heavy skirmish lines in order to achieve a concentration of firepower at the decisive area. Disregarding the lessons of the Boer and Russo-Japanese Wars, the *FSR* directed that the decisive points of the skirmish line be made "as dense as possible". However, the regulations gave the commander the flexibility to advance in "any formation" he deemed appropriate to the situation to minimize casualties while still accomplishing the mission—to include advancing by rushes. In contrast, other sections of the *FSR* stubbornly clung to admonitions about "maintaining the integrity of the attacking line and the vigor of the troops", consistent with traditional skirmish-line tactics.[59]

Other nations were also experiencing a transition period. In both Britain and France, a doctrinal struggle ensued between *fire-tactics* and the spirit of the offensive. One school believed that believed that morale and discipline, imbued in an offensive clan was a "sure antidote to fire-power."[60] [British spelling] Even General Hamilton, highly experienced in modern combat, stated:

> "War is essentially the triumph, not of a *chassepot* over a needle gun, not of a line of men entrenched behind wire entanglements and fire-swept zones over men exposing themselves in the open, but of one will over another weaker will."[61]

In lieu of developing a firepower solution to cover the final assault, following the Russo-Japanese War most military organizations acknowledged the expanded necessity for such military expedients as feints and night attacks. Like Japanese tactics, these methods sought to circumvent the deadliness of direct, daylight assaults by employing the cover of night movements.[62] The *FSR, 1913* incorporated several of these lessons. The regulations contained the addition of an entire section devoted to the details of night attacks. The *FSR* listed five cases when a night attack should be considered. Recognizing the lethality of modern firepower, two of the five cases listed were: "to gain ground over a fire-swept zone" and "to make an assault with minimum loss." Another lesson of the Manchurian campaign was incorporated in the FSRs' recommendation to deceive the enemy as to the location of the main objective by conducting false attacks and demonstrations along the front.[63] Obviously, military theorists were prescribing methods of *avoiding* direct, daylight assaults rather than devising the tactics necessary to

support them with fire.

Only small numbers of officers pressed for reforms based on firepower. For example, as early as 1912 British Brigadier-General Ivor Maxse believed that modern firepower demanded the dispersion of unit frontages. Dispersed formations would necessarily require small sections to serve as the new base unit, led by NCOs. Rapid firing weapons gave small-units sufficient firepower to survive.[64] The Commandant of the French War School, General Jean Colin, (though still advocating the retention of skirmish lines), also realized that future combat would be conducted by squads of soldiers led by junior officers and NCOs. As early as 1912, he foresaw that, "The fighting front [would] no longer consist of a continuous line of men firing, but rather a certain number of groups or swarms, each led by a non-commissioned officer." Though the use of such light infantry '*swarm*' (or '*horde*') tactics pre-dated Napoleonic times, General Colin's observations demonstrate his awareness of the need for dispersion on the modern battlefield.[65]

Unfortunately, most senior officers were still concerned with strengthening the firing line to achieve high volumes of fire through troop density.[66] Thus, armies attempted to ameliorate the deficiencies of the Boer and Russo-Japanese Wars using offensive tactics, morale, and discipline—rather than a revised system of doctrine and tactics based on the principle of '*maneuver*' elements supported by a separate '*firepower*' element.

III-B. POSITION INFANTRY AND THE BASE OF FIRE

Dispersed infantry tactics could not in themselves overcome all the problems caused by modern technology on the battlefield. In fact, extended formations had several inherent disadvantages. Even conventional skirmisher formations used during the Russo-Japanese War had revealed several limitations of the traditional command and control systems. The dispersion of extended-order formations, combined with battlefield disorder, made control of maneuver and fire discipline extremely difficult. Officers noted that small-unit control became increasingly difficult due to individual and section rushes associated with skirmisher tactics.[67] However, it was noted that a showering of bullets in general areas made up for accuracy that was lost at longer ranges and during infantry rushes. Thus, it soon became obvious that the *mass of fire* in modern battle was more critical than the *accuracy of fire*.[68] This realization led to an extremely important tactical evolution—the development of rudimentary *base of fire* techniques. *Massed fire* was now necessary to suppress defenders during the infantry advance. *Position infantry* located to the rear or flanks of the advance, could provide concentrated covering fire to support the infantry advance.

Arguably, the employment of this rudimentary *base of fire* technique was the most advanced infantry tactic devised during the war. The utilization of a *base of fire* went beyond the passive technique of dispersing assault formations and actually projected firepower on the enemy. The *base of fire* employed organic firepower to cover the movement of advancing troops as they advanced close to the enemy lines (at the critical moment when the support artillery and mortar fires were usually shifted or ceased). During the First World War, the German army would later employ the *base of fire* concept extensively in its development of *stormtroop* tactics. Assault forces were designated as maneuver (or *shock*) elements and a supporting *fire* element to cover the advancing forces.[69] Thus, the rudimentary *base of fire* techniques employed during the Russo-Japanese War can be seen as pre-cursors of advanced *fire and maneuver* tactics.

Even before the Russo-Japanese War, British theorist Colonel G. F. R. Henderson (as early as 1902), recommended using long-range infantry fire to cover advancing infantry. The British technique directed a portion of infantry be held back during an attack to provide covering fire while the maneuver element executed the attack. This infantry detachment would employ rifle and machinegun fire from positions as distant as 2,000 yards with the assistance of telescopes, field glasses, and tripods.[70] It was believed that long-range rifle fire could be more accurate and reliable than artillery support for covering

fire. Also, the British advocated firing artillery and rifle fire over the heads of friendly infantry when necessary. Henderson summarized the combined arms concept, stating "long-range rifle fire is an important auxiliary to the artillery in covering the advance of attacking infantry."[71]

During the Manchurian conflict, *base of fire* techniques proved critical in providing covering fire for assaults against prepared positions. For example, in the engagements to penetrate the fortifications surrounding Liaoyang the Japanese encountered heavy artillery and rifle fire from the Russian defenders. Japanese tactics were adjusted accordingly. During their (31 August, 1904) attack on the Liaoyang fords, the Japanese commander positioned an entire infantry battalion on an elevated ridgeline to provide covering fire for the maneuver element's assault. This battalion served as a rudimentary *base of fire*. Additionally, a preparatory artillery barrage of shrapnel and high explosive ordnance was delivered prior to the commencement of the attack to support the infantry assault.[72] Thus, as early as Liaoyang the Japanese showed a propensity to employ embryonic *base of fire* and combined arms techniques.

Likewise, at an engagement near Hill 774 (12 October 1904) examples of rudimentary *fire and maneuver* and *base of fire* techniques were displayed to overcome the density of enemy rifle fire. Under the cover of a night advance, Japanese infantry approached to within forty yards of the enemy line. Using whistle commands to control the maneuver, the Japanese skirmish line fell to the prone positions and opened a high rate of fire. Under the cover of this fire, one section from the rear supports was directed to assault the flanks of the position. Although the Japanese suffered a high rate of casualties, the position was taken.[73]

Though the Russians were slow to adapt to modern combat, fledgling small-unit *fire and maneuver* tactics gradually evolved in reaction to intense enemy firepower and the rolling terrain in Manchuria. For example, one Russian officer documented a recommended method for an infantry section (approximately thirty men) to provide covering fire for the movements of two other sections. One section provided covering fire while the other two sections maneuvered through an exposed area.[74] This technique demonstrated the increased importance of suppression fire to protect the movement of troops in open terrain. Observers also reported that the Russians employed long-range rifle fire to support infantry attacks. However, the reports claimed that this fire was largely ineffective due to poor visibility at extended distances. One observer's report related an occasion in which Russian soldiers fired blindly into a general area (with no actual targets

in sight) merely to support the friendly attacker's morale.[75]

The Japanese army's increased reliance on machineguns to provide covering fire for infantry assaults was another indicator of tactical evolution. The *mass fire* of machine guns was essential in supplementing the suppression fire provided by *position infantry* (acting as a rudimentary *base of fire).* The evolution of Japanese machinegun techniques showed the army's propensity to utilize organic firepower to *support* maneuver.

At the outbreak of the war, the Japanese army was not equipped with machineguns. However, they appeared shortly after their entry into the war. By war's end, each cavalry brigade was issued six machineguns, and each infantry regiment had three, with efforts in place to increase this amount to six. Initially, the Japanese employed the guns mainly for defense, targeting ranges of 600-800 meters. Later in the war, the Japanese began to employ machineguns offensively. The Japanese observed that the high rate of machinegun fire effectively suppressed Russian infantry fire. On the offensive, machineguns advanced with the forward units to support the infantry advance. Their targets were usually the enemy's infantry lines. The Japanese displayed advanced combined arms tactics for the times by directing machinegun fire over the heads of friendly troops when necessary. This fire was continued until friendly troops reached within thirty meters of the enemy lines. [76]

At close range, the infantry was eventually be expected to carry the attack with minimal artillery supporting fire. In 1898 (prior to the Boer and Russo-Japanese Wars), British and French officers still advocated sending guns forward on the flanks of the infantry attack to provide direct-fire support to the final infantry charge. Later, military officers prescribed *firing while in motion* (or *marching fire)* as a counter-measure. Specifically, the U.S. army had favorable experiences with the employment of *marching fire* during the Spanish-American War (1898). Officers reported that infantrymen, firing while advancing, were able to lay down enough organic fire to suppress enemy troops in their defenses. However, subsequent twentieth-century conflicts would prove this method untenable.[77] Unfortunately, the institutional utilization of *base of fire* techniques to facilitate close-in fire support was not yet fully conceptualized.[78] Nevertheless, a *base of fire* supplemented with mass machinegun fire would be required to cover the gap in close-in suppressive fires once the artillery was shifted.

Prior to World War I, fledgling methods of machinegun support emerged in an attempt to cover the gap between the cessation of artillery cover and the final infantry charge. In German doctrine, machineguns were used to lay accurate enfilade fire on the objective

after the artillery cover was shifted, “just when the crisis in the fire fight occurred.” (As previously stated, the Japanese covered their infantry advances to within thirty meters of the objective during the Manchurian campaign). Ultimately, it would take the battlefields of the Great War to settle the debate and prompt officers to increase the fire of the infantry maneuver element itself with man-portable light machineguns and other weapons.[79] [80]

However, consideration was given to the topic of close-in (organic) infantry fire support to cover maneuver in post Russo-Japanese War doctrine. The solution to suppressing enemy defensive fires to cover the close-in maneuver of assault troops would eventually be addressed by the development of *fire and maneuver* and *stormtroop* tactics during World War I. Although not advanced to this level, British and American pre-World War I doctrines had advanced to the point where they recommended the employment of direct-fire infantry weapons to assist the infantry advance. Though the term *base of fire* was not yet used, this technique marks the initial stages of *fire and maneuver* in written doctrine. Thus, the employment of *position infantry* was clearly a precursor to the later development of *fire and maneuver* tactics.

American *Field Service Regulations, 1913* contained similar usage of *base of fire* and combined arms techniques.[81] These methods were being devised to overcome the lethality of modern firepower. To cover the skirmish line’s advance, U.S. doctrine advocated maintaining a detachment of *infantry firing from position* to work in conjunction with supporting artillery. The regulations directed that, “When the infantry is ready to advance a powerful fire is concentrated upon the point of attack by all the available artillery and position infantry in range …”[82]

Additionally, the American *FSR, 1913* encouraged the cooperation of the supporting arms and maneuver element within the various stages of the attack. For example, they specified that once the advancing infantry came within the effective range of the enemy rifle fire, the supporting fire (from the artillery and *position infantry*) must assist the skirmish line in achieving a superiority of fire for the final advance. During the final advance (as stated above), the skirmish line was directed to advance by a series of rushes, maximizing the use of cover, to avoid heavy casualties. The rushes were to be executed by “parts of the line varying from battalions to individuals, according to the intensity of the enemy’s fire.”[83]

In the *Decisive Action* stage of the attack, the *FSR, 1913* promoted a rudimentary system of *fire and maneuver* tactics. Position infantry detachments were directed to

provide a *base of fire*.[84] (Supporting artillery fire was also directed to supplement the fire of the *position infantry)*. The *FSR, 1913* even directed that the reserve, normally tasked with following close behind the skirmish line, should "support the attacking line by firing from elevated positions in the rear" as the maneuver element advanced. This section of the 1913 regulations seems to have incorporated the lessons of the Boer and Russo-Japanese Wars.[85]

However, organic firepower could not in itself provide enough firepower to support infantry assaults. Supporting arms fire would be necessary to carry the infantry attack forward. Thus, the Russo-Japanese War also demonstrated the necessity of combined arms, specifically infantry-artillery coordination, in modern warfare. Additionally, indirect-fire artillery methods became necessary to increase the survivability of the batteries. The transition from direct to indirect artillery fire further complicated the coordination of supporting fires. Nevertheless, precise coordination of artillery fires with infantry maneuver was necessary to overcome the lethality of the defender's firepower.

III-C. INDIRECT-FIRE ARTILLERY & COMBINED ARMS

The doctrine of Western armies incorporated an impressive amount of information from their observations of modern conflicts, especially the Anglo-Boer and Russo-Japanese Wars. Despite some institutional resistance to change, most military doctrines addressed the lethality of modern firepower. Several hard-learned lessons of recent conflicts were apparent in early twentieth century military publications. Specifically, the increased necessity of indirect artillery fire and service arm cooperation was readily evident.

Late nineteenth-early twentieth century artillery doctrine, based on lessons originating as early as the Franco-Prussian War, professed the employment of massed artillery fire to decisively influence the battle, and counter-battery fire to neutralize enemy guns before the infantry battle commenced. Post Franco-Prussian War technological improvements (such as quick-firing artillery and smokeless powder), and the lessons of the Boer and Russo-Japanese Wars, prompted further refinement of this fundamental doctrine. The artillery piece now had a longer range than its predecessors and was therefore more lethal to the opposing infantry. Artillery pieces now fired shrapnel rounds over 2,000 meters. At this range, the artillery was outside the range of the infantry's small arms range. Therefore, neutralizing enemy artillery prior to advancing became even more critical to the attack. [86]

French artillery doctrine of this period was based on direct-fire support of advancing infantry. This was especially true after the development of the model 1897 French 75mm field gun. Artillery provided supporting fire by advancing *with* the infantry in mutually supporting gun sections. The field guns advanced from 1,500 meters by displacing two pieces forward while two others maintained suppressive fire. The artillery advance halted prior to 600 meters from the enemy and maintained a high rate of concentrated, but not particularly accurate, direct-fire (*rafale*) while the infantry made their final charge. The purpose of the *rafale* was to neutralize or, if lucky, destroy enemy targets using mass direct-fire to protect the infantry advance. Ideally, artillery sections would find suitable terrain at medium range (1,000 meters) to provide direct-fire support to the infantry attack. Thus, the main goal of the *rafale* was to demoralize the target with a high-volume of fire, rather than destroy him with accurate fire.[87] French doctrine professed that the simplicity of direct-fire methods, based on mass fire would promote quick, aggressive attacks. The sophistication required to conduct indirect supporting fires, combined with the poor reliability of communications equipment, was viewed as a drain on the aggressiveness of the assault.[88]

However, in the early twentieth century, the influence of the Russo-Japanese War caused a shift in artillery doctrine. In an effort to increase the artillery's survivability on the modern battlefield, indirect-fire techniques began to gain support. (By 1910, French artillery regulations referred to the practice of direct-fire as the "exceptional case," though it was continued in common practice).[89] Though the Russo-Japanese War had illustrated the ascendancy of indirect artillery fire, other methods persisted in both doctrine and practice. For example, German 1906 doctrine still listed three viable artillery firing positions—*unmasked* (direct-fire), *semi-masked,* and *masked* (indirect-fire).[90] (However, German doctrine did recommend *masked positions* (i.e. indirect-fires) over *unmasked positions* due to the effects of hostile fire).[91]

Pre Russo-Japanese War Russian training and doctrine did not espouse the use of indirect artillery fire.[92] Nevertheless, the war saw the transition from artillery direct-fire to indirect-fire. (Though artillerymen had previously theorized on this eventuality, the Russo-Japanese War confirmed the theories). Unexpectedly, counter-battery fire was no longer the main threat to artillery positions. The majority of Russian batteries lost in battle were overrun by Japanese infantry, not targeted by enemy artillery. The lessons of the Franco-Prussian and Boer conflicts were overturned—infantry, not artillery was now the main threat to forward deployed batteries. Russian batteries in the open were routinely destroyed by massed Japanese rifle and artillery fire. Placing batteries on exposed high ground was no longer practicable. To increase their survivability, artillery pieces were increasingly deployed in masked terrain. These measures necessitated the Japanese practice of employing observers to control the fires of the supporting artillery and quickened the conversion to indirect supporting arms fire.[93]

Thus, the events of the Russo-Japanese War had underscored a major tactical indicator — the need to complete the transition to indirect-fire artillery support. Specifically, the Battle of Telissu (14 June 1904) decisively demonstrated the importance of indirect firepower in modern warfare. The Russian army's trench line at Telissu stretched for over eight miles. The Russians, still not exploiting the advantages of low troop densities, packed their defenders shoulder-to-shoulder in the trench lines. Although the Russian First Corps commander (Lieutenant General Stakelberg) directed the guns to fire from covered positions, his orders were disobeyed. Russian artillery deployed in the open, planning to support the defense with direct-fire even though their defensive line was knowingly selected with poor fields of fire. The pre-eminence of indirect-fire artillery soon became readily apparent.[94]

During the initial stages of the battle, the Japanese replied to Russian artillery fire with only a small portion of their batteries in order to lure the Russian guns to reveal their firing positions. Within one hour of the commencement of the artillery duel, Japanese observers had determined the position of every Russian battery. While the Russian guns were distracted with the artillery duel, the Japanese launched an infantry probing attack. Japanese artillery quickly overwhelmed Russian guns and proceeded to devastate the counterattacking infantry. For example, the First East Siberian Division was decimated and was routed into the nearby mountains.[95] Telissu confirmed the dominance of indirect-fire on the modern battlefield. (One observer (French General de Negrier) claimed that both the Russians and Japanese virtually abandoned the practice of direct-fire following the Battle of Telissu. Although later at Sha-ho, Russian direct-fire artillery and machinegun positions were once again silenced by indirect Japanese artillery fire.[96] Henceforth, "infantry moving to the attack [could] expect the same close support of the artillery as they have always had, but with this difference: The artillery will accompany them with fire and not actually with the guns."[97] (original underline emphasis)

The Russians also eventually adopted the practice of using indirect-fire and artillery observers, but their employment was often disorganized. At Liaoyang on 31 August, the Russian artillery observation post had only one wire line to the gun firing positions. It soon became overloaded with traffic and the infantry was forced to improvise a "dangerous back-up communication system [of] soldiers lying on their stomachs passing messages hand to hand down the human chain to waiting messengers to the lee of the feature."[98]

The development of artillery doctrine at the turn of the century revealed several other disparities between the Great Power's employment of supporting arms. These differences had a significant impact on the tactics of the Russo-Japanese War. For example, French doctrine espoused a division of tasks in the assignments of their batteries. French batteries were designated as either *batteries d'infanterie,* (infantry batteries), or *countres-batteries* (counterbatteries). Infantry batteries were tasked to provide support to a designated infantry unit, whereas counter-batteries were concerned solely with the targeting of enemy artillery. This division of labor occurred even when the artillery batteries were of the same artillery regiment and in close proximity to each other. Thus, it was common practice for the French to mass their artillery, but divide their fires.[99]

German artillery officers considered the above listed command arrangements too restrictive. They felt that an organization based on division of labor would restrict the

ability of local commanders to react to changing situations on the battlefield. German artillerists were therefore given more latitude to coordinate with the infantry.[100] They were expected to plan their fire support based on the flow of the battle rather than rigid, pre-designated missions focused on narrow tasks. Thus, German batteries were free to switch missions based on the commander's intent. A common 'battle flow' resulting from this doctrine was to engage long-range targets, such as enemy artillery, prior to the infantry battle. Once the attack commenced the artillery focus of effort switched to engage targets that hindered the infantry's advance. Unlike their French counterparts, German artillery units were free to displace and disperse so long as the batteries were able to *mass their fires* on a single target. Gradually, the concept of *massed fires* began to gain pre-eminence over massed artillery in early twentieth century German doctrine.[101]

The concept of *schwerpunkt*, or the decisive point where the commander would focus his main effort, was central to the employment of German fire support. Once designated by the overall commander, the artillery was doctrinally bound to achieve fire superiority at the infantry's *schwerpunkt.* This unwritten cooperation was based on the ability of the artillery commander to adjust his fires to the battlefield situation in order to provide maximum support. A clear understanding of the overall commander's intent was central to ensuring supporting arms could accomplish their missions—artillery commanders would have to 'do what was necessary" for success, not merely follow orders.[102]

The Japanese army, trained by German mentors, adopted a more advanced fire support doctrine than their Russian adversaries. As a result, the Japanese displayed a large propensity to employ combined arms tactics. In terms of equipment, the Japanese were deficient when compared with the Russian artillery corps. The primary Japanese field piece was the 1898 model Arisaka gun. The weapon was a 75mm accelerated (rather than quick)-firer, with a poor recoil mechanism.[103]

By comparison, the Russian army was slower to adopt the advanced principles of *fire-tactics* and combined arms. Ironically, during the war the Russian army possessed both a better quality field piece (model 1900 76.2mm Putilov) and a vastly larger quantity of artillery on the battlefield than the Japanese.[104] However, the Russian advantages in equipment could not compensate for their poor doctrine.[105] Like most nations of the era, pre-war Russian doctrine did not emphasize cooperation between artillery and infantry. Though the Russians doctrinally approved of the concentration of artillery batteries, the massing of artillery *fires* was not addressed in their field regulations.[106] Russian artillery was generally employed as individual batteries. Although this decision

may have been influenced by the large size of Russian batteries (eight versus six guns) and their higher rates of fire, their doctrine did not place an emphasis on *massed fire*. Russian gunners preferred to maintain a sizable artillery reserve to guard against unexpected reversals. This tendency prevented concentration by dispersing combat power. Additionally, Russian inefficiency often prevented the unity of effort displayed by Japanese firing units. As a result, Russian artillery rarely was able to achieve fire superiority through the concentration of fires at the right time and place.[107] [108] (Consequently, it was estimated that twenty percent of Russian battlefield casualties were caused by enemy artillery[109] as opposed to only seven percent losses of the Japanese during the Battle of Liaoyang).[110]

In contrast, the Japanese followed the example of their Prussian tutors and consistently concentrated their artillery fire by massing their batteries. Heeding the advice gleaned from the Franco-Prussian War (imparted by the German advisors), Japanese artillery officers placed a high emphasis on supporting the infantry commander's intent. A clear understanding and adherence to the commander's intent allowed the Japanese to more efficiently mass their fires, while maintaining some degree of dispersion. 'Silent cooperation' between infantry and artillery to achieve the commander's objective enabled separate batteries to fire on the same target area without being given explicit orders.[111] For example, at Liaoyang the fires of 180 Japanese field guns and 32 howitzers were concentrated on a single position at Shoushanpu.[112] Later, the Japanese massed a total of 234 field guns and twelve heavy howitzer batteries at Liaoyang.[113]

Japanese doctrine espoused opening a battle with artillery. It was commonplace for battalions to fire as a unit (of three batteries), rather than separate employment of batteries or sections. In fact, individual employment of batteries was discouraged. Artillery was expected to provide covering fire for the infantry to assist its advance.[114] Beyond providing mere counterbattery protection, Japanese artillery was often called upon to target enemy infantry targets to assist the attack.[115] Japanese artillery supported their infantry's attacks and did not hesitate to fire over their own troops.[116] (By the war's end, incidents of Russian batteries firing over friendly troops were also reported).[117]

The Japanese overcame the problems of enemy indirect-fire by violating previously followed fire support doctrine. Japanese artillery fire was sometimes used to draw Russian counter battery fire. This reduced the amount of fire the Russians could bring to bear on the Japanese infantry attack. Thus, an important goal of Japanese artillery was to distract the Russian artillery by drawing their fire.[118] [119]

Conversely, the Japanese batteries would periodically cease firing in order to feign vulnerability to enemy counter-battery fire. This was especially effective if the Russian guns were targeting areas close to the Japanese positions. Japanese cease-fires often deceived Russian gunners into thinking they had accurately targeted the Japanese battery. This distracted the Russian gunners from more important tasks and caused the Russian batteries to needlessly bombard useless targets. (U.S. observers noted this tactic at the attack on Shihliho on 12 October, 1904).[120] Some theorists assert that the Russians should have disregarded these distracting counter-battery tactics and reduced their counter-battery fire in favor of supporting their infantry. Since the Russians were largely defending from earthworks, their susceptibility to Japanese artillery bombardments was reduced. In contrast, attacking Japanese infantry would have been extremely vulnerable to the increased fire resulting from the 'additional' batteries now freed from the artillery duel. [121]

The Japanese did not wait for friendly counter-battery fire to neutralize enemy artillery before commencing their infantry attack. Instead, their infantry would advance and draw Russian artillery fire. Japanese batteries then attempted to locate and neutralize these targets. American observers noted the propensity for Japanese gunners to sequentially attack targets in the following order: enemy batteries, infantry, supply trains and reserves, and finally in the rear area to prevent the reinforcement of the objective.[122]

The Japanese displayed proficiency in several of the aforementioned tactical principles early in the war. In the first major land action of the war (even before the revelations of Telissu), it became obvious that direct-fire artillery was obsolete. On 1 May, 1904 the Japanese prepared their divisions to cross the Yalu River by commencing an artillery duel. Prior to the battle, the Japanese had massed twenty howitzers into five batteries under the Corps artillery. The three attacking Japanese divisions contained another six batteries each. In contrast, Russian guns were dispersed along the riverbed in firing positions clearly visible to the Japanese attackers. The Russians replied to the attack with a single battery of artillery. Multiple Japanese howitzer batteries, concentrating their fires, soon silenced the Russian battery. No other Russian guns were brought into action, freeing the Japanese batteries to concentrate their fires on the Russian infantry positions. As Japanese skirmishers advanced across the Yalu River (and Ai tributary), their divisional and corps artillery provided an intense bombardment of the Russian infantry positions. Japanese howitzers, employing indirect-fire, shelled the Russian rear areas.[123] By targeting rear areas, the Japanese artillery plan thoroughly pounded the vulnerable, retreating Russian infantry during their withdrawal.[124]

The Japanese re-learned the implications of fire superiority and indirect artillery fire later in the war. On 26 August 1904 at Kao-feng-ssu, three Russian batteries utilizing indirect-fire, avoided destruction from eight Japanese batteries trying to silence them. The three Russian batteries were later able to decimate several Japanese infantry advances. The Japanese infantry advanced in traditional company column formations. Observers noted that the Russian batteries were able to concentrate "such a heavy fire … that the spirit of the attack was broken." The Japanese eventually resorted to a night attack to carry the position. The initial Russian success at thwarting the advance was directly attributed to the effect of the Russian artillery.[125]

Consequently, the Japanese were quick to learn the importance of combined arms coordination. By the Battle of Liaoyang (30 August 1904), Japanese infantry attacks were precisely timed with concentrated artillery fire support. During the Hill 1030 attack (previously mentioned), four Japanese batteries massed their fires on the Russian forward trenches, forcing the abandonment of several positions prior to the final infantry charge.[126] Henceforth, the Japanese employed artillery bombardments in conjunction with infantry attacks, seeking to exploit the advantages of combined arms. The advantages were clear—enemy troops were relatively immune to the effects of artillery bombardments while in their protective entrenchments. However, an impending infantry assault would force them to leave their covered positions to repel the assault.

The advantages of combined arms were made clear during the Battle of Shihliho (12 October 1904). Japanese artillery pounded the Russian positions, initially with little effect. Later, Japanese infantry attacked across a 1,000-yard open field. With the help of artillery cover, the Japanese infantry were able to advance by rushes to within 600 meters of the enemy without a single loss. From this point forward, the Japanese worked their way slowly forward under a hail of Russian volley-fire. However, when the Russian troops exposed themselves, they became extremely vulnerable to the accurate Japanese covering fire and suffered heavy losses from the Japanese shrapnel. The disheartened Russian soldiers abandoned their entrenchments and gave up the position. Without the support of the artillery, observers asserted that the attackers would have been decimated by enemy fire once the Russians manned their defensive positions.[127]

The Japanese consistently demonstrated the propensity to closely coordinate artillery with infantry maneuver. During the assault on La-ta Shan (13 October 1904), Japanese artillery opened the battle as usual. Under its cover, the Japanese infantry advanced, by executing a series of long rushes (through open terrain), to the foot of the sloped Russian

position. The Japanese soldiers bunched together at the base of the hill and slowly crept forward. At approximately 16:00, the distance between opposing forces was approximately thirty yards. Nevertheless, for forty-five minutes, the Japanese artillery continued a heavy bombardment on the Russian positions. Although multiple rounds fell on friendly infantry positions, the Japanese eventually carried the position when small groups of infantry charged the Russian trenches. (In addition to demonstrating the close coordination of artillery and infantry, this engagement also showed the use of section rushes (followed by troops maneuvering individually at close range) to carry forward the attack).[128]

The Russo-Japanese War had a significant effect on the development of pre-World War I artillery doctrine. By the conclusion of the Manchurian campaign, both the French and Germans agreed on one point—indirect counter-battery fire was normally incapable of destroying enemy artillery batteries.[129] However, while the destruction of enemy artillery through counter-battery fire was unlikely, both nations' doctrine acknowledged that artillery should still be used to harass, or neutralize, enemy batteries. Rather than expecting to destroy the enemy artillery, counter-battery fire was employed to minimize the effect of enemy artillery on the attacking infantry. However, whereas the French designated the previously mentioned counter-batteries, German gunners viewed artillery suppression as a task to be prioritized amongst all other artillery missions. The number of German artillery batteries performing counter-battery missions would thereby be adjusted as the battlefield situation required.[130]

Western pre-World War military doctrine also seems to have incorporated several of the implications concerning the effects of modern technology. The doctrine of most armies acknowledged the necessity of achieving fire superiority on the battlefield. Most doctrines recognized a heavy artillery bombardment as a necessary preliminary to assaults on prepared positions. Even more importantly, military theorists were beginning to devise the fundamentals of modern combined arms techniques. British theorist Colonel G. F. R. Henderson emphasized the cooperation of all service arms as a key ingredient to success on the modern battlefield. Specifically, Henderson advocated the cooperation of the infantry and artillery arms.[131]

Unfortunately, most British officers still viewed artillery as an "accessory in the fire tactics of the infantry, but not a partner in the planning of operations." Though battery commanders were expected to be familiar with the infantry's plan of attack, the *Field Artillery Training Manuals* did not explain how the fire support would be controlled, nor

did they direct a pre-arranged fire support plan. Consequently, British officers did not view battle as a progressive system to occupy advantageous firing positions to support follow-on advances with continued fire support.[132]

In contrast, pre-World War German doctrine[133] made it clear that the main task of field artillery was infantry support:

"The principle duty of the field artillery is to support the infantry in the most effective manner. Its duties are inseparably connected with those of the infantry. It should, on principle, always fight the targets that are most dangerous for its infantry.[134] [original italics]"

Specifically, the German *Field Artillery Drill Regulations* stated that, at critical times, field artillery should be expected to fire from exposed positions to support infantry attacks. German infantry-artillery tactics encompassed rudimentary combined arms tactics. Their doctrine strove to place the enemy in a dilemma by pressing the infantry attack, even when the artillery did not achieve fire superiority. The infantry assault would theoretically force the opposing infantry to abandon their sheltered fieldworks in order to counter the attack. German batteries could then more easily overpower enemy infantry. [135]

Although German pre-World War service regulations directed cooperation between the infantry and artillery arms, they (like British regulations) did not prescribe the means or techniques to accomplish this collaboration. It was generally understood that the infantry would be reliant on artillery during its attack, but no specific system governing this relationship was yet in effect.[136] A proper delineation of supporting relationships and liaison would be necessary before true combined arms techniques would emerge.

Modern infantry attacks now placed a huge emphasis on gaining a superiority of fire. However, British and American military thinkers agreed with the German doctrine, believing that preliminary artillery bombardments would be countered by keeping troops in covered positions. Similarly, they predicted that an infantry assault would be necessary to force opposing troops into the open to defend against the advance. Beyond making the defending soldiers vulnerable to artillery fire, the artillery would assist attackers by disturbing the aim of defending soldiers. This reciprocal support of infantry and artillery *throughout all phases of the battle* was summarized by Colonel Henderson's statement, "Superiority of fire can only be gained by the close co-operation of the artillery and the infantry at every stage of the attack."[137]

The doctrine produced in the years prior to World War I showed promising progress in the development of combined arms techniques inherent in *fire-tactics.* A comparison of

the U.S. *Field Service Regulations, 1905* and *1913 (FSR, 1905* or *FSR, 1913*) revealed an increased awareness of the need for cooperation among service arms and flexibility in maneuver in the early twentieth century. Both versions of the *FSR* stated, "Without superiority of fire we may assume the frontal attack impracticable."[138]

Both FSRs also contained the below paragraph:

"It is impossible to shoot an enemy out of a position. To avoid serious losses the defender has only to lie down behind cover; but a resolute and simultaneous advance on the front and flank of a position, made after a thorough preparation by and with *the effective accompaniment of artillery and infantry fire, will generally be successful*.[139] (my italics)"

However, whereas the *FSR, 1905* mentioned the need for cooperation between infantry and artillery to overcome the firepower of modern weaponry, the 1913 regulations are much more detailed, especially concerning issues such as fire discipline, plan of attack, and infantry-artillery cooperation. The *FSR, 1913* specifically addressed the integration of infantry and artillery in the attack. Artillery was directed to position itself within 3,000 yards of the enemy position in order to maximize the effect of shrapnel rounds, while remaining outside the effective range of enemy rifle fire.[140] Interestingly, the artillery's objective was listed as "that part of the enemy's forces inflicting the greatest damage to the infantry."[141] Although the regulations stated that the most likely initial target was usually the enemy's artillery, they allowed the engagement of any significant target that the commander deemed decisive, thus breaking with the requirement to commence the battle with an artillery duel.[142]

The *FSR, 1913* also directed a closer relationship between the infantry and artillery in both planning and on the battlefield. The 1913 regulations expanded upon the fundamental observations of the *FSR, 1905* and delineated a plan for the *Offensive.* The *FSR, 1913* promoted combined arms planning and execution by dividing the *Plan and Conduct of the Attack* into a planning phase followed by several distinct stages of the attack —*Preparatory Stage*, *Decisive Action*, and the *Final Stage* (consisting of consolidation and pursuit).[143]

The first phase, termed the *Plan of Attack*, directed that the offensive battle be coordinated in an *attack order* which designated the cooperation of the various service arms. The *attack order* delineated that an offensive battle commence with a *preparatory stage* designed to force the enemy into a defensive posture and ideally commit his reserves (thereby identifying his weak points). The preparatory stage relied on *all three* service arms, acting in unison, to attain a superiority of fire.[144]

The 1913 regulations went beyond tasking the artillery with the mission of preparing the battle. The *FSR* directs:

"When the infantry is ready to advance a powerful fire is concentrated upon the point of attack by *all the available artillery and position infantry* in range; at the same time the fighting all along the [skirmish] line is pushed with the utmost vigor … Under the protection of this fire the attacking infantry begins its advance and moves straight upon the objective, as rapidly as possible, *consistent with maintaining the integrity of the of the attacking line* and the vigor of the troops.[145] (My italics)"

The combined action of artillery and infantry cooperation throughout the entire course of battle was frequently mentioned: "The principle work during the attack is done by the infantry. Assisted by the artillery, it works its way from point to point toward the assigned objective."[146] [FSRs' underlined emphasis] This concept was underscored by the stipulation that during both the preparation and main attack, artillery officers or scouts *accompany* the commanders of the infantry firing lines. These artillery observers were directed to communicate the requirements of the infantry to the artillery batteries via signals or wire.[147] Like Russia and Japan, the U.S. military's use of artillery observers acknowledged the increased attention necessary to coordinate artillery indirect-fire with infantry maneuver.

During the *Decisive Action* stage, the direction concerning infantry-artillery coordination was more specific. The artillery was directed to "assist the main attack" by positioning itself "so as to bring, at the proper time, a heavy fire on the objective." Both artillery and *position infantry* were tasked with covering the advance of the attacking force with "powerful fire concentrated upon the point of attack." The *FSR*, 1913 directed that the progress of the infantry maneuver element and the conduct of supporting fires should be mutually related. It stated, "If the attacking line is temporarily checked, the intensity of the covering fire must be increased to keep down the fire of the enemy."[148]

The artillery was directed to provide covering fire by the most effective means possible, to include displacing to a better position during the attack. During the infantry advance the covering fire was maintained on the enemy line until the friendly infantry approach within 300 yards of the impact area.[149] When the infantry reached their final firing positions, artillery support became extremely complicated. As the infantry charge neared the objective, close-in artillery fire was necessarily shifted or ceased to prevent fratricide. At this *Final Stage* of the battle, the artillery was directed to shift its fire to the rear of the enemy's position to "impede the movements of possible hostile reserves and to spread confusion in the rear of the enemy's position." After friendly forces took the objective, the artillery was directed to rapidly displace to positions which could support

the consolidation and pursuit. However, the effects of unsuppressed rifle fire on advancing infantry were devastating at close-range.[150]

This problem was somewhat alleviated by allowing the fire of percussion ordnance to continue to within 150 meters or closer. Under extremis, even these sound safety measures were abandoned. For example, at the Battle of Pieters' Hill (Boer War, see Appendix C) the commander directed his infantry to maintain supporting fires even if "two or three of their shrapnel burst in the ranks of his infantry."[151] During the Russo-Japanese War, the same sentiment concerning the value of supporting fire over risk of fratricide prevailed:

> "The moral effect produced by artillery fire, which forced the defenders to take to cover and did not permit them to raise their heads above the parapet, was so highly esteemed by the Japanese infantry that it requested the batteries to continue firing, without regard to the losses thereby inflicted in its own ranks, until it had taken the position or unfurled small national flags as an indication that fire support was no longer necessary. According to the opinion of the Japanese themselves, the losses inflicted in their own infantry by their own guns were insignificant in comparison to the losses which the defender could inflict by delivering his fire undisturbed at a range of a few hundred meters, when not kept down by the attacking artillery."[152]

IV. THE SIEGE OF PORT ARTHUR:

Combined Arms and Small-Unit Maneuver

The evolution of Japanese infantry and combined arms techniques during the siege of Port Arthur provides a useful study of the synergistic evolution of tactics during the Russo-Japanese War. The protracted campaign of infantry assaults against an extensive network of fortified defensive positions foreshadowed the First World War's Western Front. The evolution of Japanese assault tactics combined dispersed, irregular infantry formations with precisely coordinated artillery support. Advances in *both* areas were necessary to allow the Japanese to achieve final victory. Consequently, the Japanese victory at Port Arthur demonstrated the aggregate advantages of linking *fire and maneuver* with combined arms techniques. Arguably, the tactics developed to break the Russian defenses served as precursors to the German *stormtroop* tactics developed under a similar battlefield environment.

Japanese employment of combined arms tactics evolved in reaction to their early attempts to press the siege of the Russian fortifications at Port Arthur. Following their initial failure to carry the Russian positions of Wangtai and Ridge H on 23-4 August, 1904, the Japanese determined that normal open assault methods would not lead to victory. Beyond reinforcing their forces with siege artillery, a determined effort was made to coordinate infantry attacks with artillery support. Attacks were supported by bombardments from siege artillery, howitzers, field guns, and naval guns.[153] Although their early attempts to take the Russian stronghold failed, Japanese tactics were beginning to adapt to trench combat. This was demonstrated by the 24 August 1904 attack on the Panlung forts where 400 Japanese guns supported an infantry assault with a creeping barrage.[154] One observer stated that, "It looked as if there was not a single foot of ground which had not its own particular shell, and the whole ridge was enveloped in a thick cloud of smoke and dust from the explosions."[155] This description seems eerily similar to the description of combat on the First World War's Western Front.

Later, on 26 October 1904 the Japanese assaulted Russian positions at the perimeter of Fort Erhlungshan and Fort Sungshushan. A naval gunfire and howitzer bombardment of the entire frontage commenced at 11:00 and continued throughout the day. At 15:30, the bombardment intensified and increasingly focused on the trench lines surrounding Erhlungshan and at Sungshushan. At 16:30, the intensity of artillery fire further intensified

on the two positions. A coordinated infantry attack commenced at 17:00 by two infantry columns of approximately 200 men, who successfully overran the trench line positions. The artillery bombardment continued during the assault with designated troops waving flags to identify the forward trace of the advance for the artillery observers. Nevertheless, several Japanese shells fell among friendly troops. However, the protection offered the assailants was so effective that scarcely a man was lost taking the Sungshushan trench line and not a single soldier was lost during the assault on Erhlungshan (by enemy fire).[156] Although this primitive method of combined arms coordination was not flawless, it demonstrated the high level of coordination between Japanese artillery and infantry.

Later in the Port Arthur siege, further refinements in *fire and maneuver* and combined arms tactics were evident. Many lessons had been learned during months of failed attempts to take the Russian forts at Erhlungshan, Sungshushan, 203 Meter Hill, and North Tungchikuanshan. In late (26-30) November, the Japanese launched several unsuccessful and extremely costly attempts to seize the fortresses. Initially, the assaults were conducted by dense skirmisher and close-order formations, causing heavy casualties.[157]

By December, a marked change in infantry tactics had occurred. Poorly supported mass attacks had not succeeded in overwhelming strong Russian defensive positions. The final assault on 203 Meter Hill (5 December 1904) demonstrated an adjustment in Japanese tactics. A fierce bombardment was conducted for three days with 1,000 rounds a day pounding the hill. The initial infantry assault was made by a company advancing up the hillside in groups of twos and threes. The forces regrouped in a trench and advanced through a dead zone in extended-order. Before (and during) the final attack on the Russian trenches, six Japanese batteries conducted an intense bombardment using a mix of half shrapnel and half high explosive shells. The successful attack demonstrated the importance of close infantry-artillery coordination and the need for small unit maneuver (utilizing irregular formations). Because of its commanding position, the capture of 203 Meter Hill, enabled it to serve as an excellent artillery position for subsequent attacks on the nearby Russian fortifications.[158]

By late December, the frequent employment of new assault techniques was obvious to military observers. On 31 December American observers witnessed Japanese soldiers advancing under the cover of a heavy artillery barrage. Each artillery battery was assigned a specific target to support the infantry advance, and was controlled by an observation post atop the newly won ‘Artillery Hill’ (203 Meter Hill). Following the bombardment, the observers noted small groups of two to three soldiers entering the Russian fieldworks. In a

follow-on attack on the Wangtai fortress (1 January 1905), small, irregularly formed groups of infantry crawled up the slopes of objectives, covered by heavy artillery fire. The artillery, firing over the heads of the slowly advancing infantry, conducted a vigorous bombardment of the hilltop fort. The lead trace of the infantry was located a mere 100 feet below the summit of the hill. At a designated time, the artillery shifted its fire, and the infantry advanced in irregular formations (averaging one-half *zug*) to take the now-abandoned Russian trench. The infantry controlled the supporting artillery fire using flag signals. A group of 25 soldiers reached the Wangtai parapet and an even smaller detachment of ten men initially entered and seized the fort.[159]

V. CONCLUSION

The Anglo-Boer and Russo-Japanese Wars demonstrated the full impact of the Industrial Age on modern warfare. The implications of these regional conflicts certainly foreshadowed the destruction caused by the First World War. However, the commonly asserted claim that the lessons of previous conflicts went unheeded by incompetent or foolish generals is inaccurate. The armies of the Great Powers had painstakingly analyzed the ramifications of the Boer and Russo-Japanese Wars. Often, the tactical advances made during the Boer and Manchurian Wars were the result of tactical exigencies that were not codified into written doctrine during the hostilities. After the wars, some basic concepts were incorporated into doctrine. However, due to institutional and cultural resistance, written doctrine alone could not guarantee assimilation into the practical training methods of the respective armies.

Following the Russo-Japanese War (and earlier Boer War), an incomplete transition from skirmish line-based tactics occurred that encompassed the effects of modern warfare. This transformation included several tactical evolutions. The resulting developments can be grouped into four broad categories:[160]

(1) the adoption of dispersed, irregular (non-linear) formations;

(2) the employment of *fire and maneuver* techniques and small unit-tactics, including *base of fire* techniques;

(3) the transition to indirect-fire artillery support to ensure the survivability of the batteries, and;

(4) the necessity for combined arms tactics to increase the survivability of assaulting infantry and compensate for the dispersion of infantry firepower.

The need for dispersed formations became evident as early as the American Civil War and Franco-Prussian War. The Boer and Russo-Japanese Wars not only confirmed the necessity for dispersed formations, but also foreshadowed the transition to non-linear assaults. Ample evidence existed that linear skirmish lines would soon be obsolete. In fact, both wars witnessed formless units advancing by running, rushing, and crawling—especially during the Russo-Japanese War. The Manchurian campaign saw occasional employment of small-unit detachments moving through an otherwise impenetrable fire zone. Some observers identified dispersion through small-unit maneuver and irregular formations as keys to overcoming intense firepower. These small units varied from platoon, squad, and fire team-sized elements. The need for small-unit maneuver to counter the massive firepower of fortified defensive positions became especially apparent as the

siege of Port Arthur progressed, foreshadowing the trench warfare of the World War. Intense Russian defensive fire from fortified positions caused small detachments of men, rather than large formations, to cross the defensive zones (at the assaults on 203 Meter Hill, and Wangtai).[161]

Additionally, irregular formations, consisting of dispersed, small-units of infantry required a modification of the military's command and control system. Although these decentralized leadership principles would not be fully developed until the First World War, it became apparent that modern soldiers would be required to display high levels of individual initiative and independent action. The initiative required surpassed the earlier expectations for skirmishers to merely make individual decisions concerning rates of fire, target selection, and the use of cover in the advance. In the near future, small-unit leaders would be responsible for achieving the commander's overall guidance with minimal supervision over a widely separated battlefield. The Japanese military's adoption of the German principles of *Auftragstaktik* and *Weisungsführung* certainly contributed to their successful employment of small-unit and *fire and maneuver* tactics.

Dispersed infantry now needed the assistance of external firepower to bolster their reduced volume of fire. The dispersion of tactical formations and the decentralization of fire control had caused the diminution of concentrated rifle fire. The use of *position infantry* to provide a *base of fire* was an improvisation developed to compensate for mass infantry fire. Eventually, machinegun fire would be used to supplement this covering fire. Thus, the Russo-Japanese War (and Boer War) showed the necessity for a transition from *fire and movement* to *fire and maneuver* (though neither conflict attained the latter concept in its entirety).

Consequently, both wars saw limited use of a stationary *base of fire* to cover the movement of the infantry maneuver element.[162] This technique was especially important to cover the movement of attacking infantry during the final assault when mortar and artillery fire was normally shifted or ceased. Military observers took note of the effectiveness of these techniques. Resultantly, post-war doctrine showed evidence that these lessons were incorporated into infantry doctrine. Both British and American publications (in doctrine or professional forums) made note of *position infantry* to provide cover for assault forces. Later, *fire and maneuver* and *stormtroop* tactics would make extensive use of infantry *base of fire* techniques.

Coordination between artillery and infantry was made more difficult by the necessity for indirect artillery fire. The Battle of Telissu definitively demonstrated the necessity for

artillery to fire from covered positions in order to survive on the modern battlefield. Indirect-fire would lengthen the distance between the batteries and the frontline infantry, necessitating a higher level of effort to effect proper coordination.

Lastly, *fire-tactics* demanded increased cooperation between artillery and infantry. Nearly every Western military organization identified this occurrence in their doctrine. [163] Artillery fire was now expected to support all phases of the attack, not merely the preparation. Additionally, artillery objectives were not necessarily enemy artillery batteries, but any target that threatened the infantry's progress. This often necessitated firing over the heads of friendly infantry at extremely close ranges. Liaison between the artillery and infantry arms necessarily assumed increased importance. This cooperation was complicated by the adoption of increasingly dispersed, non-linear infantry formations. Techniques involving artillery forward observers, fire support communications, and signaling systems surfaced, but were in their infancy.[164]

The dispersion of firing batteries (for survivability) further necessitated the *massing of fires* rather than massing of the actual artillery formations. Like decentralized infantry tactics, the dispersed artillery units would now have to support the commander's *schwerpunkt* with minimal direct guidance. The pre-World War period was a transition period for this artillery-infantry relationship. As previously covered, nearly all nations recognized the necessity for increased cooperation among service arms, especially artillery and infantry. Most nations demonstrated their awareness *of the concept* in written doctrine, but had not issued specific command and control guidance delineating exact relationships.

Regardless, the Boer and Manchurian Wars showed a huge increase in artillery support for infantry attacks. By Pieters' Hill and Driefontein, British artillery 'rolling barrages' provided close, precisely timed artillery support during the infantry attacks. (See Appendix C) The Japanese army demonstrated superb coordination of artillery throughout the Russo-Japanese War, but especially during their assaults at Liaoyang and Port Arthur. They also consistently demonstrated the advantages of *massed fires* in artillery supporting fire. Most nations' post-war doctrine reflected this newfound awareness.

Even so, the incorporation of doctrine does not in itself constitute an evolution in tactics. Three basic steps are required to fully incorporate changes into military practice. The first step is to gather and critically examine new opinions and observations. Second, the organization must modify existing regulations, tactics, and doctrine. Last, and most important, the institution must reinforce the newly written tactics with realistic training. [165] Barring the last step, doctrine remains theoretical rather than practical. Observations

and examinations of the Boer and Manchurian Wars (during and after the conflicts) accomplished the first step. The majority of Western armies implemented the second step by issuing revised training manuals in the early 20th century. Unfortunately, the critical third step was never fully achieved prior to the First World War.

Though written doctrine was adapted to the implications of increased firepower, military culture was not significantly impacted. In fact, strong institutional and intellectual arguments prevented the progress of modern *fire and maneuver* tactics. Deeply ingrained concerns over the loss of control on the battlefield and faith in the ability of morale to overcome firepower prevented the full realization of new doctrine. Lessons of earlier conflicts were disregarded or minimized. In the years leading to the First World War, the Anglo-Boer War was increasingly viewed as an anomaly. Likewise, the lessons of the Russo-Japanese war were also distorted. Observers asserted that "despite high losses the Japanese had defeated the Russians in Manchuria through offensive spirit, cold steel and high morale rather than firepower."[166]

Most military officers recognized the lethality of modern weaponry but consciously decided that offensive spirit and morale could overwhelm firepower. Accordingly, British officers expected losses in modern assaults to reach as high as twenty-five percent, but insisted that there was a "necessity to suffer loss in order to drive the assault home." Amazingly, the concept that psychological qualities could offset firepower led several officers to promote close-order formations to boost the morale of attacking soldiers.[167] The high casualties of the Great War would prove the British estimates correct—a conscious decision had been made to pay the price to overwhelm firepower with men!

Because it was commonly believed that a combination of morale and disciple could bolster offensive tactics, no further tactical advances were deemed necessary. Military officers and theorists failed to realize that an entirely new system of war would be necessary for success on the modern battlefield—not merely modifications to existing tactics. Instead, most pre-World War I debate revolved around adjustments to current tactics and doctrine, (such as offensive versus defensive tactics, dense versus thin skirmish lines, etc.). The assumptions upon which pre-World War I tactics were based—the perceived requirements to mass soldiers to increase infantry firepower, and the need to retain control over troops on the battlefield—would be proven "both false and costly."[168]

Therefore, military leaders did not ignore the lessons of the Boer and Russo-Japanese Wars. In fact, the ramifications of increased firepower and rudimentary techniques of fire

and maneuver tactics were addressed in most nations' pre-World War I doctrine.[169] Unfortunately, these concepts were not fully developed or practiced due to a failure to recognize a change to the fundamental nature of warfare itself. Massive firepower necessitated a new system of warfare. To effect this type of transformation, the entire military culture—equipment, doctrine, organization, and leadership—would have to evolve. Lamentably, the hard-earned lessons of the Boer and Russo-Japanese Wars had not prompted such a reformation. It would take the cataclysm of the First World War to act as a catalyst for this transformation.

APPENDIX A: THE END OF AN ERA

The American Civil War (1861-1865)

The nineteenth century witnessed several phases of technological advancement. The first phase of technological progress occurred in the mid-nineteenth century and saw drastic improvements in the effectiveness of weaponry, transportation, and communications. Scholars cite the advent of rifled weapons, breech-loading armament, railroads, and the telegraph as examples of new technology available on the battlefield. [170] Accordingly, many historians describe the American Civil War as the first major war in the Industrial Age.[171] These innovations had profound effects on the Napoleonic tactics still being practiced by most military organizations. Increased firepower resulted in the expansion of skirmisher tactics and an emphasis on flanking maneuvers. However, most armies stubbornly clung to close-order tactics as the primary battle formation in the post-war years.[172]

The advent of the Minie ball, and subsequent rifled firearms and artillery, should have drastically altered each of the service arm's tactics. The effective range of rifled small arms was four times that of its predecessor's, foreshadowing the end of linear, close-order infantry tactics.[173] Specifically, rifling had enabled infantry formations to produce accurate fire to over 200 yards and increased their effective range to over 400 yards.[174] The later introduction of breech-loading rifles greatly increased the rate of fire and allowed defenders to reload in the prone position.[175] Costly Civil War battles such as Malvern Hill, Fredericksburg, Gettysburg, Cold Harbor, and Franklin demonstrated the lethality of modern weaponry against frontal attacks in open terrain and should have foreshadowed the end of the manpower-squandering infantry charge.[176]

The tactics of the various service arms were also affected. Rifled artillery now outranged the older smooth bores. Long-range rifle and artillery fire tended to force smooth bore artillery even further to the rear of the battlefield thereby reducing its effectiveness. The infantry's increased battlefield prowess enabled foot soldiers to shatter cavalry attacks. This vulnerability relegated the cavalry's mission largely to scouting, screening advances and retreats, protecting flanks, raids, and exploiting enemy routes created by infantry assaults.[177]

The Civil War experience should have resulted in increased importance placed upon the proper utilization of infantry on the battlefield, though most Civil War commanders, and

those who would follow, failed to recognize this development. The roles and abilities of artillery and cavalry, although still extremely important, were not as decisive as in the Napoleonic Era. Increased firepower, at extended ranges, gave the defense a definite advantage over close-order offensive tactics.[178]

Nevertheless, infantry tactics during the Civil War remained largely linear. Most battles commenced with the formation of a *line of battle* oriented on adjacent units or key terrain. The war's basic infantry formation was a regimental battle-line of two to three ranks with skirmishers posted forward to prepare the attack. During the attack, units would advance while attempting to maintain a linear, albeit a loose, formation. The battle-line was believed to allow maximum combat power to be concentrated on the enemy while advancing. Thus, the close-order formation remained the fundamental infantry tactic.[179] However, some Civil War commanders adapted linear tactics to compensate for the increased lethality of the defender's firepower. Lines were extended in order to reduce the density of the formation in an effort to reduce casualties.[180]

Pre-war American tactical doctrine was based on the drill manual of General Winfield Scott. It espoused close-order infantry maneuver in two or three ranks. Interestingly, pre-war infantry manuals did reflect the contemporary influences of French doctrine stemming from Napoleonic armies. Particularly, American drill manuals professed the limited use of skirmisher tactics.[181] Scott's tactics recommended skirmisher teams of two men working together in a loosely aligned skirmisher line. Units formed as skirmish formations were directed to maintain a reserve of no less than one third of its strength, demonstrating the army's uncertainty concerning the decisiveness and survivability of open-order units on the battlefield.[182]

Just before the outbreak of the American Civil War, the U.S. Army released a revised drill manual that incorporated some of the latest European tactical concepts—Lieutenant Colonel William J. Hardee's *Rifle and Light Infantry Tactics for the Exercise and Manoeuvres of Troops when acting as Light Infantry or Riflemen* (1855). Hardee's manual retained close-order maneuver as the standard battlefield tactic, but expanded the emphasis on skirmisher teams. Skirmisher formations were expanded to four-man teams with an increased importance placed on accurate rifle fire from covered positions.[183] Thus, the manual showed restrained progress toward looser tactical formations.

In actuality, by 1864 skirmisher formations were fairly common on the battlefield. It was not uncommon to have regiments deploy anywhere from ten to one hundred percent of its infantry as skirmishers. However, the skirmishers' mission was to screen or probe

the enemy rather than perform the decisive action of the battle. Formed infantry nearly always conducted the main attack, with rare cases of main attacks being executed solely by skirmishers.[184]

There were isolated incidences of conceptually advanced assault tactics. For example, (brevet) Major General Emory Upton's infantry attack at the Battle of Spotsylvania (10 May 1864) revealed his advanced thought process:

> "Upton thought that if you were going to storm an entrenched position you had to move fast. To stop and open fire—standard procedure, at the time—was to lose, simply because men standing up in the open got shot much more rapidly than men concealed behind earthworks. Upton told his men to keep going without a halt and without firing a shot, and he organized them in four compact lines, making an assaulting column that was narrow and deep. The first line was to swarm over the Rebel parapet with fixed bayonets, the next two would fan out to right and left to clear the trenches on each side, and the fourth line was to provide reinforcements wherever they were needed. If all of this worked, Upton believed, his men could punch a narrow but deep hole in the Confederate line; if supporting troops then came up to exploit the opening, Lee's position would be broken …."[185]

His brigade's assault demonstrated innovative assault techniques based on small-unit maneuver (though still utilizing traditional formations) to break the enemy lines.

Thus, some officers recognized that to penetrate enemy breastworks, defended by modern firearms, modifications to Napoleonic tactics would be necessary. Even prior to Spotsylvania, (then-Colonel) Upton had been promoting 'hammer blow' tactics, which sought to penetrate enemy defensive lines using densely packed column formations. Upton believed a compact formation, moving rapidly across the battlefield, could successfully pierce enemy trench lines. Essentially, Upton was attempting to overcome enemy defensive fire using speed rather than firepower. Column formations would not allow friendly troops to maximize their offensive fire. However, at close distances, the column could traverse the battlefield quickly, with enough shock power to break the enemy lines. After the first line of troops penetrated the trench line, following lines would turn to the left and right to hold and expand the breach for exploitation by follow-on troops.[186]

Upton's *hammer tactics* were a limited success at Spotsylvania. His attack succeeded in penetrating the Confederate lines. Unfortunately, failure to exploit Upton's initial success resulted in a Union retreat. On 12 May 1864, the Union army would re-attack, again employing Upton's tactical concepts, in a corps-sized attack. The results were the same—an initial success resulting in ultimate failure.[187] Upton's tactics, while innovative, would obviously not be effective in future conflicts involving machine guns and accurate artillery supporting fire. However, his tactical innovation displayed a basic recognition of the need for change.

Notwithstanding, the Civil War was fought using largely traditional Napoleonic tactics and leadership principles with only minor modifications. Infantry close-order formations deployed in three lines to attack. The unity of the battalion, rather than the flexibility of extended order, was emphasized. In terms of leadership, junior officers were expected to carry out their guidance and were not encouraged to maneuver or deviate from their superior orders, excepting extremely rare situations where higher control became impractical.[188]

It was not until two years after the war that any written evidence of tactical evolution appeared in American doctrine. Major General Upton released *A new System of Infantry Tactics, Double and Single Rank, adapted to American Topography and Improved Firearms* (1867). Upton was largely responsible for drafting the U.S. Army's post-war doctrine. Although the title acknowledged the effects of increased firepower on post-war tactical doctrine, it also retained close-order formations. However, Upton did acknowledge his premonition that future battles would most likely be fought in a single-rank battle line (in contrast to his title) or a large skirmish line. Conversely, the preface of Upton's drill manual demonstrated the army's continued reliance on close-order tactics over skirmishers for decisive results and ease of command:[189]

"Whatever the changes the breech-loader may necessitate in the disposition and management of troops in battle, the employment of lines of battle offensively and defensively cannot be dispensed with, neither can the means of massing and deploying troops be omitted."

"While attacks in masses have been abandoned, a preponderance of men and fire, in the future as in the past, will have to be relied upon to carry positions which are beyond the power of skirmishers … experience will prove that *the safety of an army cannot be intrusted [sic] to men in open order with whom it is difficult to communicate; but that to insure victory, a line or lines of battle must ever be at hand to support or receive the attack*.[190] (Italics added)"

Interestingly, Upton acknowledged the need for modern soldiers to be imbued with a limited amount of initiative in order to make individual battlefield decisions, yet refused to abandon close-order tactics. He advanced beyond all previous drill manuals by including limited tactical guidance in his text by discussing the applicability of various maneuvers to certain battlefield situations. Specifically, the manual incorporated basic steps of tactical planning such as designating pinning forces, flanking forces, and reserves. (Hitherto these matters were regarded as the realm of commander's discretion, and therefore not discussed in drill manuals).[191]

More importantly, the evolution of Upton's later tactical thought showed increased reliance on skirmisher tactics to overcome the lethality of breech-loading weapons. By the time of his post Franco-Prussian War tactical publications, Upton's overturned his

previous views concerning the inability of skirmishers to achieve the decisive stroke in combat. In his 1878 tactical analysis of the *Armies of Asia and Europe*, Upton acknowledged that most European (and American) tactical doctrines now employed skirmisher formations, posted in two lines, as the standard infantry combat deployment. Skirmishers were to advance by executing a series of rushes with the skirmish line being continually reinforced (by supports) to maintain high rates of fire. U.S. Army doctrine employed a single line of skirmishers[192] deploying from line or column. Breech-loading arms allowed soldiers to reload without moving to the rear. Therefore, a single line formation could now maintain a continuous, high rate of fire. Thus, the reduced density of a single skirmisher line would theoretically reduce casualties while still maintaining a high volume of fire in the attack. (Ambrose, *Upton and the Army*, p. 60; Jamieson, *Crossing the Deadly Ground*, p. 10). The inclusion of precise maneuvers to allow entire battalions to deploy skirmisher formations left no doubt as to the pre-eminence of the skirmisher line in post-war tactics.[193] By the late nineteenth century, battlefield roles were reversed—skirmisher formations, not dense battle lines, were expected to carry the decisive battle action. The main purpose of supporting formations was now to reinforce the skirmish line. [194]

Specifically, Upton's infantry formations directed battalions (consisting of four companies) to be divided into two sections. The first section, composed of two companies, would form the skirmisher line. The second section, also of two companies, would follow directly behind the skirmishers in lines of supports and reserves. The skirmishers would move forward in small rushes while other squads[195] maintained harassing fire. Doctrinally, skirmishers would advance to within 150 yards of the enemy line while the reserves formed for the final charge. Hopefully the first line of charging reserves would break the enemy line. If not, the second line of reserves would be committed to the attack. Thus, Upton's tactical formations attempted to maintain high rates of fire in the advance to compensate for its dispersion. Advances were made in small rushes to reduce casualties in the attack. The fundamentals of *fire and movement* upon which Upton based his skirmisher tactics remained valid until the twentieth century.[196] [197]

However, the dispersed nature of extended-order tactics demanded a sharp increase in the individual initiative and responsibility of the officer and soldiers. By 1878, Upton's previous observations concerning individual soldier's morale and initiative had evolved substantially:

> "In the new [skirmisher] system the major assumes the functions of a brigade commander; a captain requires the

knowledge and skill of a colonel; a lieutenant performs the duty of a captain; a sergeant takes the place of a lieutenant, and a corporal, no longer required to simply fire his musket, takes command of a squad or section."

"To all of these grades latitude is given in the management of their commands under fire, and hence an error in judgement in any one may initiate a movement that may lose a battle".[198]

Although still struggling with the loss of control inherent with extended-order formations, Upton's doctrine was acknowledging the expanded roles of small unit leaders and subordinate initiative on the modern battlefield.

The largest doctrinal advance made by the post-war American army occurred with the issuance of its revised 1891 *Infantry Drill Regulations (IDR).* The 1891 tactical manuals expanded Upton's fundamentals by including 'tactical interpretations.' Though not advanced to the point of endorsing combined arms tactics, the manuals attempted to "instruct officers how to maneuver and engage their troops to gain advantages in battle." Conceptually, the new *Drill Regulations,* separated mechanical drill motions from tactical maneuver. This conceptualization was practically applied by dividing the manuals into two sections—*Close Order,* which directed the formations necessary to bring troops *to* the battlefield, and *Extended Order,* for its skirmisher employment *on* the battlefield.[199]

Importantly, the 1891 *IDRs* designated a squad of eight men as the basis for its extended-order tactics. The regulations directed dispersed groups of men to advance under the hail of enemy gunfire individually, by rushes. Professional reviews of the *1891 IDRs* made such dramatic observations as "[w]ith these tactics the line of battle disappears.… The fighting line will consist of a series of squads as skirmishers, the normal number of men in a squad being eight." Arguably, this was the most advanced tactical thinking displayed by the American army to date.[200]

Unfortunately, Civil War armies and their successors did not stress combined arms and tactical coordination among service arms. The epitome of Civil War era staff expertise was commonly viewed as the execution of a successful flanking maneuver rather than the detailed orchestration of an attack. Civil War infantry attacks often displayed poor cooperation among service arms, resulting in minimal exploitation of the benefits of combined arms.[201] The U.S. army continued its under-emphasis on inter-arm cooperation in the years following the Civil War. In 1874, the War Department published revised drill manuals using the concept of 'assimilated tactics.' However, rather than attempting to create combined arms doctrine, assimilated tactics merely strove to disseminate a "system of commands and formations that were compatible among infantry, artillery, and cavalry." Thus, the army was focused on the basic task of ensuring service

arms could *understand* each other rather than the more complex capability of *coordinating* with one another.[202]

Ironically, Napoleon, who most Civil War commanders strove to emulate, willfully sought to combine the strengths of the army's service arms to maximize his chances of victory. Though the concept of combined arms had not yet been formally developed, Napoleonic battle tactics often included an artillery bombardment to weaken the enemy line, followed by an infantry assault to seize the main objective. The decisive action, normally performed by the cavalry or infantry reserve, exploited the broken or weakened line. Napoleon thereby employed combined arms to influence the battle at key times and locations. Unfortunately, detailed cooperation among service arms seems to have eluded most Civil War commanders.[203]

APPENDIX B: BREAKING THE LINES

Wars of German Unification (1864-1871)

If the American Civil War did not prove the necessity of adopting open-order tactics, the Wars of German Unification, especially the Franco-Prussian War, certainly reinforced the concept. Even before the Franco-Prussian War, the Austro-Prussian War of 1866 demonstrated the effects of modern firepower. The combination of the superiority of the Prussian 'needle-gun', superb fire discipline, and flexible skirmisher formations was credited with assisting the Prussians in tactically overwhelming the Austrian army. However, the odds (in terms of weaponry and tactics) would be nearly even during the Franco-Prussian War. Both nations' armies possessed breech-loading rifles and armies trained in skirmisher tactics.[204] By the outbreak of the War of 1870, the French army was armed with the reliable *chassepot* rifle. The *Chassepot* had a flat trajectory and longer range (1,200 meters) than the Prussian Dreyse 'needle-gun' (800 yards). As a result, the Prussians found it extremely difficult to maneuver against French infantry in the open when not supported by artillery fire.[205] Though close-order formations were still expected to carry the decisive action, observers noted that skirmisher formations were better suited counter the firepower of breech-loading weaponry.[206]

The increased firepower resulting from rifled, breech-loading weaponry had a large impact on the participants of the Franco-Prussian War. Observers of the war noted both an evolution in infantry tactics and the implementation of combined arms techniques (beyond those of Napoleonic origin). Military officers realized that extended-order skirmisher tactics would be critical to survival on the modern battlefield. Additionally, they asserted that combined arms techniques would be essential to the success of infantry attacks.[207]

In terms of combined arms techniques, military observers noted the necessity for increased interaction and cooperation between service arms. The Germans derived the term *Great Tactics* to describe the integration of service arms.[208] The Franco-Prussian War saw an increased emphasis on the importance of combined arms, especially artillery fire, to support infantry maneuver.[209] Although the infantry was still expected to execute the decisive stroke, artillery was credited with deciding several key battles by preparing and covering the ground movement.[210] Integration was given a high priority, resulting in evolution beyond Napoleonic era *Grand Tactics*, (or the integration of infantry, cavalry, and artillery after gaining contact with the enemy). Turning movements,

now routinely practiced by German commanders, were heavily reliant on artillery support for success. Artillery not only prepared the battlefield, but also supported the infantry turning movements.[211] To achieve a superiority of firepower the Germans often massed their artillery into huge formations.[212] The increased range of the German 80mm field gun allowed them to concentrate in relative safety from the shorter-ranged French pieces. [213] [214] (The longer range of German pieces enabled them to engage enemy targets at ranges as high as 3,500 yards. However, most artillery battles were fought at ranges less than 1,600 yards).[215]

To neutralize the lethality of enemy artillery, while still covering the infantry advance, German artillery planners divided battles into two distinct phases—counter-battery fire and infantry support. Increased artillery range assisted the Germans in achieving their first task, the neutralization of the French batteries. Once the enemy guns were silenced and the infantry advance was commenced, the German's dissolved their concentrated formations and pushed artillery to the front lines to support the infantry. These forward-deployed units fought as batteries, sections, or individual guns and provided direct-fire support to the advancing infantry. Ideally, the infantry would advance under the cover of friendly artillery fire. Prussian infantry came to depend on friendly artillery fire to suppress defensive *chassepot* fire.[216]

Due to the increased lethality of small arms, direct-fire artillery support was extremely costly to the gun crews. Regardless, German gun crews were routinely placed within enemy small arms range in order to provide cover to advancing infantry. German field artillery regulations dictated that Prussian infantry should "never have to do without the support of the artillery" and that Prussian artillery "must not, in decisive moments, avoid even the heaviest infantry fire."[217]

The effects of technology also resulted in modified infantry tactics. Specifically, infantry in open terrain would have to be deployed in extended-order skirmisher formations to survive. Additionally, the movement of infantry formations would now have to be covered by artillery fire, or "distant musketry fire" to provide it protection while moving.[218] (Arguably, this concept was a precursor to the contemporary *base of fire* concept). Though German doctrine dictated positioning supports as close as possible behind advancing infantry, heavy enemy fire resulted in supporting formations remaining at the extreme effective range of their weapons to increase their survivability.[219]

The French opened fire with their *Chassepots* at ranges of 1,000 to 1,400 paces. Although this long-range fire was moderately effective, it rarely checked Prussian

movement. The fire was strong enough to force the Prussians to deploy half-companies into skirmisher formations to continue the advance. Within 800 yards of the enemy position the intensity of enemy firepower normally necessitated that the remainder of the regiment assume skirmisher formations. Only preparatory movements, protected by covering terrain, could be executed (in the more easily controlled) close-order formations. [220] [221] At 500 paces *chassepot* fire became extremely effective, and by 400 paces infantrymen were forced to seek cover or assume prone positions. Advances were accomplished by a succession of rushes using terrain to provide cover. As a result of the high volume of breech-loading rifle fire, firefights grew heated at ranges from 500-150 paces from the enemy position. Although not yet reflected in official doctrine, the battlefield experience of the war proved that "extended order [was] the rule, close order the exception."[222] Notwithstanding, the rigors of actual combat prompted the German army to deviate from its written doctrine in order to survive on the battlefield:

> "As the absolute impossibility of this [close-order] maneuver, so much practiced on the parade ground, was apparent to our generals, it was never attempted on the offensive, and when tried on the defensive generally failed. On both sides therefore, the tactics of the drill ground and peacetime maneuvers were completely altered as far as concerns the fire of the masses".[223]

Consequently, close-order and volley-fire tactics were abandoned in favor of skirmisher tactics. In fact, throughout the course of the war the relationship between the roles of skirmisher and close-order formations was reversed—instead of merely supporting the attack, skirmishers now performed the decisive action. Conversely, close-order formations were relegated to covering the skirmishers' advance with massed *supporting fires*.[224]

However, like the commanders of the American Civil War, German army leadership was hesitant to relinquish close-order formations due to the advantages in discipline and control inherent in linear tactics. The loss in control caused by extended formations would necessitate an increase in the discipline, initiative, intelligence, and self-reliance of the average soldier and non-commissioned officer. Both junior officers and individual skirmishers would now be required to make independent decisions including the use of cover and terrain, fire discipline, and the aggressive use of supporting arms. The reduction in direct tactical control, combined with the need for semi-independent action, would result in the employment of a smaller tactical formation—the company—as the base tactical unit.[225]

In most Western armies, deeply ingrained concerns about the loss of discipline and morale prevented a full conversion to modern tactics. Officers worried that an over extension of skirmisher lines would result in a loss of control, discipline, and morale. Even

such forward military thinkers such as Prussian Generals Wilhelm Balck and Albrecht von Boguslawski warned against such over-extension and too much reliance on extended-order tactics.[226] In fact, fear over losing control during battle caused a reverse in advanced military doctrine. The German *Drill Regulations of 1888*, while mentioning the importance of subordinate initiative, retained close-order formations as the primary attack formation.[227]

British military theorist, Colonel G. F. R. Henderson, in his initial (pre-Boer War) writings, felt that the interest in extended-order tactics brought about by the Franco-Prussian War was overemphasized and "fundamentally unsound."[228] [229] Some senior officers felt that extended-order formations were difficult to control and resulted in subordinate units that exercised too much independence. Henderson cited examples from the War of 1870 of both individual soldiers and entire companies deviating from their initial orders and maneuvering to seek cover. Henderson claimed that these deviations caused confusion and disorder on the battlefield.[230]

Henderson viewed the German tendency for subordinate initiative and decentralization in a poor light:

> "… once the zone of aimed infantry fire is reached, the control of the firing line must perforce be resigned to the section leaders, and that even the captain can only exercise a very general supervision over his company, whilst battalion commanders are expressly forbidden to interfere, during the passage of this zone, with the action of their subordinates. There is no disposition to restrict the responsibility of the subaltern officers, and the maxims laid down in the Field Exercises, as well as the training of the battalions, have for their object the fitting of the junior officer for important duties".[231]

In response, Henderson yearned to,

> "… restore the order and cohesion to the attack which it lost in 1866 and 1870, to substitute for rashness, impatience, and individual fighting, the strength and momentum of *concentrated numbers bound together by a discipline which permits no swerving from the line of direction* … better adapted than the disintegrating methods of the Germans …[232] (My italics)"

Henderson believed that the cooperation of service arms was the key to success in battle—substantially more important than skirmisher tactics. He feared that the dispersion of troops would lead to "lack of strength at the decisive moment, the dispersion and intermingling of tactical units, and the control of the troops taken out of the hands of the superior leaders."[233] Henderson's desire to maintain order on the battlefield was exemplified by his approval of the late nineteenth century British drill book revisions. The pre-Boer War doctrine stressed that "instead of encouraging excessive exercise of initiative, the paramount importance of order, of the cohesion of the attacking body, and maintaining the true direction is included on every page."[234]

In accordance with Henderson's views, several British officers would later revert to traditional formations in an effort to maintain order on the battlefield. A compromise in the varying doctrines resulted wherein, "Close and extended order combined [were] officially taught as the form for infantry; close order whenever it is possible, extended order only when it is unavoidable." Additionally, the British drill book emphasized the frontal attack to achieve the decisive action, rather than flank attacks.[235] Ironically, these observations are the exact opposites of those the Prussians derived from the Franco-Prussian War.

It took the catastrophe of the Anglo-Boer War to convert Colonel Henderson to a supporter of extended formations. His post Boer War observations reversed his previous writings and praised the versatility of extended skirmisher formations and the exhibition of subordinate initiative on the battlefield. In his later (post-Boer War) writings, Colonel Henderson finally realized that to survive on the modern battlefield, infantry in open terrain would have to advance in extended-order, with "at least five paces between skirmishers [along with] supports and reserves in the same open order."[236]

APPENDIX B: PART II—THE RISE OF THE CAPTAIN

Prussian Doctrine of Subordinate Initiative

Since field grade officers could no longer exert direct control over the dispersed extended-order formations, the role of junior officers became more prominent. Company commanders (normally captains) would have to make independent decisions based on the general directions from their superiors, rather than mindlessly following the orders of senior officers. This necessitated an increase in the "power, responsibility, and independence of action" of junior officers.[237] According to one senior military officer, "there should be no interference whatever with a company … except through the captain"—a radical statement for the times.[238] Concepts stressing increased subordinate initiative would have huge implications in the development of doctrine in the years to follow, especially German command and control methods.

The experiences of the Franco-Prussian war strengthened the emphasis on decentralized leadership concepts. In order to overcome the uncertainty of the modern battlefield commanders would be expected to make decisions on their own, without waiting for higher direction. After the War of 1870, there was a better understanding that military precepts were "intended to be adapted with elasticity to prevailing circumstances; one must act up to the living spirit, not to the dead letter."[239] Even before the war, the *Reglement of 1812* had espoused concepts such as *Auftragstaktik*, or mission tactics, which demanded individual initiative from all leaders in order to achieve the commander's overall objective. This new doctrine was designed to allow the army's leadership to operate under conditions of battlefield uncertainty without becoming paralyzed.[240]

General Graf Helmuth von Moltke (the elder), Chief of the Prussian (later, German) General Staff from 1858-1888, was uniquely capable of adapting and modifying the principles of war practiced by Napoleon to the technological advances of the Industrial Age.[241] The precepts of his innovations have their origin in the nineteenth century Prussian doctrine of *Kesselschlacht*— battle of encirclement and annihilation. Though the doctrine was being modified to account for developments in firepower and other technology in the post-Napoleonic Era, its basic principles remained ingrained in the German command mentality—conduct flanking attacks in order to encircle and destroy the enemy army.[242] In 1869, even before the war, the German General Staff had issued the *Regulations for Higher Troop Commanders.* The regulations "warned against the

futility of frontal attacks and urged that wherever possible Prussian troops should attack the flanks of the enemy position."[243] Flanking and encirclements were directed as the key elements of Prussian doctrine. Moltke had already identified the strong advantages associated with a tactical defensive and was determined to exploit them.[244]

Moltke realized that the centralized military operations, which were effective during the earlier Wars of German Unification, would no longer be sufficient due to the effects of advanced technology brought about by the Industrial Age.[245] The influences of the Industrial Age would cause Moltke to build upon the theories devised by his predecessors in the General Staff. By analyzing the lessons of the American Civil War and Prussia's experiences in the minor Danish War of 1864, the General Staff realized the newly gained predominance of defensive tactics. The Prussian military was adapting to the effects of modern firepower on offensive operations.[246]

The basics of Prussian tactics included the employment of an advanced guard to reconnoiter the location and disposition of an enemy force. Ideally, (if the situation favored a decisive battle), an artillery detachment would be used to cover the main body's movement to concentrate and deploy on the battlefield.[247] Superior numbers and firepower would thereby be concentrated on the enemy.[248] The Franco-Prussian War provided Moltke ample motivation to enact additional changes to Prussian tactical doctrine. Huge manpower losses at the Battles of Spicheren and Worth reinforced the fact that increased firepower had made frontal attacks extremely costly. After much loss in initial frontal assaults, both battles were ultimately decided by German flank attacks.[249] [250]

Ideally, Moltke strove to employ the advantages of modern technology to coordinate the movements of separate units so as to converge simultaneously on an enemy force. This would allow the Prussian military to execute an operational-level encirclement of the enemy. The aim of Moltke's strategy was to ensure that the Prussian army retained the initiative, thereby forcing the enemy to react to its actions.[251] Specifically, the Prussian goal was to employ operational maneuver to force the enemy into frontally attacking a strong friendly position. The advantages of the tactical defense could then be exploited. In order to account for modern technology, the Prussian *Kesselschlacht* doctrine remained offensive, but Prussian tactics were becoming increasingly defensive.[252]

However, modern technology also enabled enemy armies to detect and react to tactical flanking attacks initiated after contact had been established. Additionally, the huge frontages of modern armies, combined with the range and lethality of modern weaponry,

made turning movements within the range of the enemy impractical. Therefore, to be successful, flanking attacks had to be conducted outside the enemy's reconnaissance zone. These factors demanded that maneuver forces remain separate—only to converge during, not prior, to battle.[253] Ideally, Moltke strove to fix his opponent with a strong advanced force, and then envelop him with the remaining forces converging from multiple axes. Moltke's revolutionary concepts gave birth to the operational-level of warfare by espousing maneuver to accomplish strategic objectives.[254]

APPENDIX B: PART III—LEADERSHIP BY DIRECTIVE

Weisungsführung

Moltke's belief in decentralization went beyond tactical concerns and permeated the highest levels of his strategic thought. At heart, he was a firm believer in the Clausewitzian dictums concerning the uncertainty of warfare. Moltke defined strategy as a "system of expedients."[255] Since a commander could never accurately forecast the outcome of an engagement, a series of improvisations would ultimately overcome binding orders. This type of environment would once again highlight the necessity for independent action by local commanders. According to Moltke, the best service a commander could provide his forces was skillful staff work aimed at concentrating the army at the place and time that provided it with the maximum possible advantage. Once deployed, a commander should be issued only broad, conceptual objectives. In order to react to unexpected occurrences, the local commander must be given the latitude to make independent decisions.[256]

Although technology had increased the ability of military staffs to control large armies, the weakness of Moltke's operational planning was the limitations of the 19th century's fledgling communications systems. Extensive coordination between widely separated armies, and between each army's individual service arm components, was extremely critical to success in modern warfare. The existing communication systems—primitive radios, telegraph networks, and couriers—could not ensure reliable and timely coordination between military organizations.[257] In order to overcome this weakness, Moltke strove to modify the entire high-level command philosophy of the Prussian army. In order to allow operational maneuver, German army commanders had to operate with a limited amount of independence. Although all the armies had to work harmoniously towards the achievement of common strategic objectives, individual subordinate commanders would have to display command initiative in order to overcome the limitations of the current communications system.[258]

Theoretically, Moltke's command philosophy would overcome the obstacles of commanding distant armies by instituting the practice of *Weisungsführung* (or leadership by directive). The General Staff would issue operational plans to army commanders, then rely on their individual initiative (assisted by a competent staff officer corps) to achieve the expected objective.[259] This leadership philosophy recognized that the local

commanders were the best informed to make appropriate decisions. Consequently, the German command system allowed subordinate commanders wide latitude. The desire to maintain centralized coordination was attained by the issuance of general directives describing the overall objective. The system also ensured that time critical decisions could be made without the delays previously required to seek approval from higher authorities. The German operational tempo, by encouraging the issuance of timely orders, would now have a decided advantage over Germany's enemies'.[260]

In the years prior to the World War, the German concept of initiative was expanded by General Helmuth von Moltke (the younger—nephew of his elder namesake). He realized that modern generals would have to control massive armies along fronts that were hundreds of miles long. Though the German High Command (or *die Oberste Heeresleitung*, OHL) would later flounder under his leadership, the younger Moltke's clear understanding of the need for subordinate unit initiative and mission-type orders was displayed by his pre-war comments:

"[Modern war] will probably always at first come to fractional battles of individual armies or army groups. If the conduct of these battles leads to a common result, which lies within the sense of the whole operation, then the operation was correctly conducted. These individual battles can however lead to fragmentation and thereby destroy a whole operation. They can lead to a situation in which everything dissolves into individual fighting groups, each of which pursues its own particular purpose … The High Command will not always be able to bring to battle under favorable conditions every army in the extensive operational area. However it probably can and must keep in view *a great, clearly recognized, logical, and firmly held goal, and continually direct all forces toward this goal*[261] [My Italics]"

The younger Moltke deduced that the High Command should not attempt to directly influence the conduct of battles. The OHL's mission was transformed into directing actions at the operational level. Subordinate unit commands would now be responsible for the conduct of their battles and associated maneuvering.

Clearly, the younger Moltke had expressed the need for increased initiative at the individual army headquarters. He believed huge armies, fighting on vast battlefields, would force modern commanders to *depend* on their army commander's initiative, stating, "The Supreme Command needs to be intelligently helped by the initiative of army commanders. The latter, on their side, should always think in terms of the general situation and try increasingly to conform to it."[262]

This process marked the diffusion of subordinate initiative to the lower levels of army command. This practice would expand until subordinate initiative and adherence to mission-type orders were demonstrated at the lowest levels of army command.[263] A distinct difference between the German army and its opponents was the German army's

encouragement of junior subordinate initiative. This tendency was demonstrated in both the staff corps and regular army line units. Junior officers were routinely given important tasks. For instance, even lower-ranking General Staff officers had direct access to both frontline commanders and senior staff officers.[264]

APPENDIX C: VICTORY THE HARD WAY

The Anglo-Boer War (1899-1902)

Britain entered into the Boer War woefully unprepared for the effects of modern conflict in almost all aspects of training, doctrine, and organization. The obsolescence of British training and doctrine was described by J. F. C. Fuller as a system that viewed war,

> "… as an unending succession of Peninsula engagements …It never considered what the enemy might or might not do … It was rigidly formal, rigidly conventional, and rigidly exact. To doubt the doctrine of the 1896 Drill Book, with its columns and echelons and its squares would have been heretical … When this is realized, I feel we ought to be charitably disposed towards those gallant gentlemen who led us from one tactical absurdity into another; for they had been schooled in a system which was absurdity itself".[265]

The British army corps organization was equally outdated. The basic tactical unit of the British army was the battalion. The regimental headquarters performed mainly administrative functions. The corps system was not yet established as a permanent institution, but rather a temporarily formed expeditionary force composed of individual units. This *ad hoc* organization had never previously trained together. Neither the corps nor divisional headquarters possessed staffs whose caliber of training allowed for even basic coordination of service arms.[266]

Additionally, the composition of the expeditionary corps was faulty. The British War Office initially emphasized infantry over cavalry. The first British divisions sent to Africa contained two brigades totaling 10,000 men. Of that total force, only 850 were cavalrymen.[267] In fact, of the first 45,000 troops sent to Africa, only 6,000 were cavalry or mounted infantry, regardless of the fact that the British staff college had taught that cavalry was "the most desirable arm to contend with the Boer."[268] Regardless, British cavalry would have most likely been ill prepared for the task of reconnaissance and screening. Their pre-war training still emphasized Napoleonic era shock tactics rather the subtler tasks related to observation and intelligence.[269] A shortage of cavalry would cause difficulties in reconnaissance and screening during the expedition's early operations. For example, during Lt-Gen Lord Methuen's offensive to relieve Kimberley (beginning in November 1899), a lack of cavalry reconnaissance assets restricted the execution of any wide, flanking maneuvers. The expeditionary force advanced with a minimal reconnaissance screen and performed few operational-level maneuvers to gain a positional advantage on the battlefield.[270] This lack of operational (and even tactical) maneuver is shocking when viewed in direct contrast to the operations of the Prussian army in the War

of 1870. (See Appendix B)

Even before the outbreak of the Boer War, the British army was made aware of several of its tactical deficiencies. In 1898, the British army conducted peacetime maneuvers that demonstrated the army's reliance on frontal attacks (without planning secondary supporting attacks), and its complete disregard for performing reconnaissance prior to attacking. British tactics were heavily dependent on rigid formations of the Napoleonic era and Crimean War rather than the skirmisher formations made prevalent by the War of 1870. Though British doctrine had incorporated limited use of skirmisher tactics, these techniques were not regularly practiced due to training area restrictions in Britain. For the same reasons, the development of combined service arm tactics was not practiced during peacetime. Specifically, infantry tactics depended on close-order formations employing volley-fire at close range. Infantry maneuvers were not coordinated with the artillery, nor did they attempt to use the terrain to cover their advance.[271]

Huge British losses of the Anglo-Boer War once again warned of the obsolescence of close-order infantry tactics. As stated above, British written doctrine at the beginning of the war espoused close-order battalion formations with a large emphasis on volley-fire. Though the *Drill Book of 1896* did not include any guidance on the deployment of troops in extended-order, battle regulations did allow the use of a skirmisher screen to cover the frontage of an advancing formation. However, the main attack was to be conducted by Napoleonic era close-order infantry formations consisting of three battle lines.[272] Independent skirmisher fire was advised only at short range, after the volley-fire was completed. The British infantry advance relied on volley-fire, delivered at close range, rather than the German technique of individual skirmish fire at longer ranges.[273]

Specifically, British tactics recommended advancing, (in close-order) to within 800 yards of the enemy line before deploying. At that time, a battle deployment of three lines (attack, supports, and reserves) was formed for the attack, in close or extended-order. Virtually no emphasis was placed on preparing the attack by fire. British artillery was not encouraged to cooperate with infantry once the attack commenced. Employment of single batteries was commonplace even though British doctrine recommended the concentration of batteries. As with most armies, direct-fire was the normal method of fire, with effective ranges between 1,500 to 3,000 yards.[274]

In contrast to rigid British tactics, the capabilities of the Boer infantryman's Spanish/German Mauser model 1893 rifle exploited the advantages of modern technology. The rifle was fed by a rapid loading cartridge clip that dramatically increased its rate of

fire. Additionally, the round had smokeless powder which helped the shooter remain hidden. The Mauser's flat trajectory was especially lethal within 300 yards, but effective over 1000 yards.[275] The ability to produce a high volume of accurate, long-range rifle fire allowed the Boers to adopt revolutionary infantry tactics to support their defensive war.

Boer light infantry, armed with Mauser rifles in irregular formations, decimated British regulars, advancing in columns.[276] This became apparent early in the conflict during the skirmish at Graspan (25 November 1899) when a British naval brigade, attacking a Boer position in close-order, suffered nearly 50 percent casualties. In the same skirmish, "well-dispersed supporting infantry suffered few losses", yet the British continued to overlook the discrepancy in their tactics.[277]

Later, the harmful effects of British un-preparedness were again made obvious by the extremely heavy British losses during the "Black Week" of December 1899. In the span of six days (10-15 December 1899), the Boers repulsed the British army in three separate battles (Stormberg, Magersfontein, and Colenso). The combined casualties caused the British 380 killed, 1,550 wounded, and 860 prisoners of war compared to the Boers' 100 killed and 250 wounded. In each case, the British army failed to reconnoiter strong Boer defensive positions prior to its advance.[278] The high British casualties can be largely attributed to the Imperial Army's outdated tactics and doctrine.

For example, at the Battle of Magersfontein (11 December 1899), the British deployed 4,000 men in a (close-order) *quarter column* formation.[279] The British commander planned on advancing the column to within 300-500 yards of the Boer positions before deploying to an extended-order formation with a frontage of 2,500 yards. During the advance, a large portion of the formation was pinned by heavy Boer rifle fire. In order to extricate them, a huge artillery barrage was executed to cover withdrawal of the pinned British infantry. The British army suffered 950 casualties (seven percent of the division[280]), with 210 killed, as compared to Boer losses of 90 killed and 188 wounded.[281] Though British artillery was used extensively, the protection afforded by the Boers' defensive fighting positions reduced the effectiveness of the bombardment, demonstrating the importance of fieldworks on the modern battlefield.[282]

Later at Colenso, 6,000 Boers were able to resist the advance of 21,000 British troops from dispersed defensive positions along a riverbed. The Boers derailed the two-pronged British attack by decimating a forward deployed artillery brigade with infantry rifle fire.[283] Despite the possession of a superior number of artillery, the British infantry main

assault, without effective artillery support, ground to a halt. (Forty-four British artillery pieces opposed five Boer guns). Meanwhile, the second prong of the attack, also formed into dense, slow-moving quarter columns, was stalled by heavy Boer fire.[284]

In these early battles, the strength of the defensive became readily apparent to the Boers. Boer infantrymen adopted revolutionary defensive tactics, including digging individual fighting positions on forward slopes, rather than ridges and hilltops.[285] Fighting positions increased the accuracy of Boer rifle fire since the firing point was level with the ground—creating lethal “grazing fire” as opposed to “plunging fire”. Grazing fire, with its level trajectory, was lethal out to the Mauser’s maximum effective range—substantially longer than “plunging fire” which, due to its steep firing angle, was short-range and inaccurate.[286]

These tactics worked superbly at the Battle of Modder Bridge (November 1899), demonstrating the strength of the tactical defense. British forces could have easily flanked the Boer position, but opted for a frontal attack. Disregarding their own cavalry’s warnings of enemy reinforcement, the British attacked straight into a strong enemy position. The British main infantry force was once again pinned by accurate Boer rifle and artillery fire, aided by the placement of whitewashed stones as range markers. British infantry within 1,200 yards of the Boer front were forced to crawl to avoid the enemy artillery and rifle fire, and mounted troops could not safely approach within 2,000 yards. More importantly, the British artillery formations had to withdraw to positions 1,400 yards from the front to avoid withering enemy fire. The British were once again forced to rely on a heavy artillery barrage to withdraw their pinned forces and press a flank attack.[287]

During the initial (conventional) phase of the war, the dispersion of frontline troops was central to Boer tactics. At the battles of Magersfontein and Colenso, the Boers maintained a density of 600 men per mile of frontage. The low density of forward-deployed troops reduced the effectiveness of British artillery preparations, but was strong enough to counter the nominal British cavalry and screening forces.[288] The concept of low troop density tactics foreshadowed the flexible defense doctrine that would later be developed by Germany in World War I.[289]

British Boer War tactics slowly evolved, reflecting the use of low-density troop ratios to counter increased firepower. By the Battle of Paardeberg (February 1900), British firing lines were described as “strong, but not dense” and were deployed at long range (outside enemy effective rifle fire). Formations were formed in breadth rather than depth to increase survivability. (In fact, German observers noted British lines were so thin at places

that they did not possess enough firepower to continue the advance without reinforcement from supports).[290] Additionally, once within the enemy's effective weapons range, only skirmisher formations were employed. British infantry advanced by any means possible—running, rushing, and crawling— rather than using rigid linear tactics. Demonstrating basic *fire and movement* tactics during the assault, alternating portions of the firing line covered sections conducting rushes. However, the cooperation of artillery and infantry was still evaluated as weak by German observers.[291][292]

The Boer War demonstrated the pre-eminence of artillery on the modern battlefield. (The British army's reliance on artillery to extricate its trapped infantry has already been covered, but the Boers' unconventional artillery tactics also underscored several critical lessons). The Boers' scarcity of artillery pieces caused them to devise irregular defensive tactics that yielded successful results. A common Boer tactic was to employ single guns rather than batteries. A single piece was often successful at contesting a pass or ford, in addition to bogging down the advance of an opposing force. For example, although Boer artillery fire was not credited with causing an inordinate amount of casualties at Ladysmith, it was effective at disrupting and preventing British ground sorties.[293]

On several occasions, small numbers of Boer guns were able to neutralize much larger numbers of British pieces.[294] Though this disparity was partially due to the longer range of the Boer guns, a large portion of blame must be attributed to faulty British artillery doctrine.[295] British artillery tactics demanded a counter-battery artillery duel prior to commencing the infantry battle. However, the previously mentioned dispersion and entrenchment of Boer artillery made this counter-battery duel largely ineffective. To be successful, the British would have to coordinate their infantry and artillery attacks, rather than treating them as separate events. During the pre-attack artillery bombardments, Boer defenders were relatively safe in their field works. However, if the British had coordinated their artillery bombardments with the infantry advance, the Boers would have had to expose themselves to artillery fire to defend against the advancing infantry.[296]

British post-war artillery doctrine seemed to incorporate these lessons. If the British possessed superiority in artillery, their guns were massed to achieve a concentration of fire. However, if the enemy had a superiority of artillery, British gunners were directed to disperse their firing units (in batteries or sections) along the infantry firing line, (mirroring Boer tactics). Unfortunately, the British had incorporated a lesson with a skewed objective. Boer artillery tactics were devised solely for defensive tactics. Boer artillery dispersion, though effective in harassing and neutralizing enemy attacks, was not designed

to influence an offensive battle.[297] Massed artillery and later, *massed fires* were to become the way of the future.

In addition to out-ranging British guns, Boer artillery employed improved firing pits known as *Schanzes*[298] In addition to providing cover and concealment, the firing pits were often situated to provide indirect flanking fire, (rather than direct-fire that the British army doctrinally employed).[299] Beyond highlighting the need for combined arms coordination, the tactics noted above warned that the days of direct-fire artillery were coming to an end. Though successful in the Boer War, the *Schanze* confirmed the vulnerability of forward-deployed artillery and foreshadowed emergence of indirect-fire artillery methods. Improved munitions introduced after the war would render even hardened firing pits susceptible to enemy direct-fire weapons.

Unfortunately, the changing character of the conflict promoted another inaccurate doctrinal lesson. Early Boer War battles showed heavy reliance on artillery to compensate for poor infantry tactics. However, from June 1900 to May 1902, the Boer War transitioned to a guerrilla war against mobile light-infantry. As tactical operations became 'lighter', artillery played an increasingly minor role. Mounted troops, rather than firepower, proved instrumental in countering mobile Boer guerillas. This occurrence was reflected by the changing composition of the British expeditionary force. By 1901, the British Forces contained 79,000 mounted troops (including cavalry, mounted infantry, and mounted Yeomanry). Cavalry and light mounted troops seemed to play an increasingly important role in modern combat.[300] This trend was in direct contrast to the Prussian observations concerning the diminished role of modern cavalry and pre-eminence of massed fire. (See Appendix B)

Nevertheless, the Boer War did convince the British that the primary purpose of artillery was to support infantry—not to target enemy guns. Henceforth, the British would focus on gaining fire superiority for its attacking infantry by concentrating its fire on the enemy line. The Boer rifleman's lethal accuracy convinced British officers that the primary threat to friendly infantry was enemy infantry, not artillery. British artillery was now truly viewed as a supporting arm.[301]

Modified British tactics coordinated artillery support with infantry maneuver. By the time of battles such as Railway Hill and Hart's Hill (also 27 February 1900), fledgling *fire and movement* infantry tactics, supported by artillery, had been developed. A system of long rushes at greater distances, followed by short rushes at closer ranges was utilized in the infantry advance. Each wave of infantry, upon reaching its final position provided

covering fire for subsequent waves. After all assault waves were in their designated positions, the final attack was commenced.[302]

The British now realized that the coordination of infantry attacks with artillery support was essential. The Battle of Pieters' Hill (27 February, 1900) demonstrated the first British employment of a 'rolling barrage' in the Boer War. The earlier attempts at using low angle artillery fire (of shrapnel and high explosives rounds) on the enemy fighting positions had proved largely ineffective. Instead of focusing on a counter-battery duel prior to the battle, artillery was tasked with providing a 'creeping barrage' just ahead of advancing infantry. A bombardment of over 70 guns protected the initial deployment of troops. Rolling artillery cover, combined with the aforementioned infantry rushes, proved successful at the Battles of Pieters', Hart's, and Railway Hills.[303] Prior to this time, British artillery would cease-fire once the infantry commenced its advance so as not to fire over friendly troops. This resulted in the artillery remaining in 'observation' during critical periods of the attack.[304]

At the Battle of Poplar Grove (7 March, 1900) British columns, though still employing line tactics, deployed a full ten kilometers from the enemy positions and employed extended-order formations rather than close-order.[305] Before the war's end, the British commander issued instructions ending the use of close-order formations in the attack. The instructions advised deployment to tactical formations between 1,500 to 1,800 yards of the enemy positions to remain outside the effective range of enemy observation and rifle fire. By 1901, the British *Infantry Drill* directed the avoidance of independent frontal attacks, if at all possible.[306]

By the Battle of Driefontein (10 March 1900), the British Army displayed great improvement in tactics. British commanders correctly identified firepower as the decisive element of combat and designed their battle plan accordingly. The correct balance between firepower and reduced troop density on the firing line was achieved. Thinly formed skirmish lines were gradually reinforced during their advance by the reserves. This allowed the British to achieve and maintain a superiority of fire. Additionally, a well-placed regiment on the flanks provided effective enfilading fire to cover the advance (over open terrain) of the main attack. British artillery also supported the advance of the maneuver units. Multiple batteries concentrated their fire on the decisive points along the Boer lines rather than being distracted into participating in an artillery duel. The artillery maintained its fire "close in front of the assaulting infantry" during the infantry advance. The battle demonstrated the importance of *fire and movement* in "continually increasing

the strength of the fire, and then hurling the shaken enemy from its position by means of a resolute assault," that characterized modern war.[307] Additionally, fledgling *fire and maneuver* tactics were demonstrated by the employment of an entire regiment as a *base of fire* to cover the advance of the main attack. Driefontein underscored the dominance of fire-tactics over shock tactics.

Early British tactics had employed frontal assaults with minimal cooperation from the artillery. Often this cooperation was limited to the near worthless practice of employing 'artillery reconnaissance'—using artillery to draw enemy fire. However, post-war British military reforms incorporated several important lessons. First and foremost were the implications of modern firepower. The massed formations found in the *Infantry Drill Book of 1896* were replaced with modern *fire-tactics.* The Boers' rapid, long-range fire had rendered conventional line and column tactics obsolete. Also, since volley-fire had proven ineffective against low density targets, *The Provisional Course of Musketry for the Year 1902* made the precipitous step of abandoning volley-fire and omitting several antiquated drill positions, in addition to encouraging the use of cover in the attack. Post-war doctrine directed advancing infantry to open fire at 650 yards to conserve ammunition, intensify close-in fire, and improve accuracy. Additionally, the ineffective practice of 'artillery reconnaissance' also abandoned.[308]

Arguably, the most significant artillery lesson of the war was the increased employment of long-range fire and the resultant indirect-fire techniques. The British pre-war *Artillery Drill Book of 1896* defined the maximum engagement range as 3,500 yards. In contrast, Boers trained with the ranges as high as 6,800 yards. By war's end, British gunners had enacted doctrinal and equipment modifications and were targeting ranges of up to 9,000 yards. This involved shooting at targets the gunners could not see (i.e. indirect-fire). Accordingly, increased emphasis was placed on the training and communication of Forward Observers to observe fire now out of eyesight. This task was made more difficult by the loose skirmisher lines and rushes that replaced the rigid, predictable, close-order formations of the past.[309] By the war's end, British gunners showed an evolution in advanced firing methods—employing direct, indirect, and predicted fire techniques.[310] [311]

Like the Prussians, pre-war British artillery doctrine (advocated in the *Artillery Drill Book of 1896)* had stressed the forward deployment of guns during an infantry attack to provide maximum covering fire. Gun placement was determined by several factors, including a position with a clear view (direct-fire) and good cover. In contrast, Boer

gunners chose their firing positions based largely on protection from enemy fire. As a result, the Boers frequently deployed their guns behind ridges and hills to provide long-range, indirect-fire. Although this resulted in dead zones at various areas, the Boers were willing to accept these limitations to preserve their numerically scarce assets. By 1902, British post-war doctrine showed an evolution in artillery support concepts. The revised doctrine emphasized cover and concealment, resulting in a compromise between protection and the tactical limitations of indirect-fire.[312]

The Boer War also underscored the importance of the high rates of fire made possible by the advent of magazine-fed rifles and machineguns. The British devised an offensive doctrine for the employment of machineguns. The army initially classified them as artillery and even organized them as batteries. During the Boer War, the British deployed machineguns at the rate of one per line battalion. By 1908, the army had two per battalion and requested double that amount. Machinegun tactics sought to maximize the weapon's effects on the 'middle ground', from 900 to 1,600 yards, where enemy rifle fire was not very effective against the gun crew. It was estimated that a single machinegun could provide the same firepower as fifty riflemen. By 1911, the British army had established a machinegun course which stressed several of the points learned during the South African campaign—concealment, surprise, and engaging targets in depth. With enemy infantry deploying into assault formations at 1,800 meters, accurate rifle fire was not effective at these extended ranges. The only difference between this system and the techniques employed in the First World War was the ratio of weapons to troops and the employment of interlocking fields of grazing fire. The Boer War foreshadowed the concept that future warfare would favor the *massed fire* of machineguns over individual marksmanship of riflemen.[313]

Though the South African War demonstrated the value of the machinegun and laid the basis for future doctrine, its development as an offensive weapon was impeded by technical problems related to weight and reliability. (Early water-cooled guns weighed sixty pounds plus water and were prone to jamming and overheating). These deficiencies led some officers to resist the procurement of machineguns or limit their employment to the defense. Even after the Russo-Japanese War had proven the machinegun's usefulness, the British officer corps remained divided on the specifics of its tactical employment. Eventually, two machineguns were attached to each infantry battalion, though some officers felt they should be organized into batteries to augment or replace artillery.[314]

The increased employment of machineguns in European armies at the turn of the

century led most military organizations to the realization that dense, regular skirmish lines were impractical. Loosely formed skirmish lines executing short rushes were necessary to overcome the mass fire of machine-gunners. Accordingly, as a result of their experiences in the Boer War, the British adopted a skirmish line interval ranging between five to fifteen meters.[315][316]

By 1901, British command and control concepts had also evolved in marked contrast to pre-war doctrine—dispersed, highly-mobile infantry rushed and crawled in attacks controlled by whistle commands given by junior officers and NCOs. Individual soldiers and junior leaders had the responsibility to find cover and direct the timing of their rushes in accordance with the commander's guidance.[317] Previously, the colonial influence on the army encouraged British commanders to become personally involved in the detailed execution of orders rather than merely providing overall guidance—decentralization of command necessary for semi-independent operations would have been considered peculiar. In contrast, the revised *Combined Training Manual* identified the need for increased subordinate initiative, stating:

> "Success in war cannot be expected unless all ranks have been trained in peace to use their wits. Generals and commanding officers are, therefore, not only to encourage their subordinates in so doing by affording them constant opportunities of acting on their own responsibility but, they will also check all practices which interfere with the free exercise of the judgement, and will break down, by every means in their power, the paralyzing habit to routine, when acting under service conditions".[318]

As a result, junior officers and NCOs were allowed a marked increase in responsibility and command.

Dispersed formations demanded a modified command and control system. Like Moltke's Prussian command concepts, the British began to realize that a commander could only control a battle in the broadest of terms. Subordinate initiative of junior officers and NCOs would be necessary to accomplish the commander's overall objectives.[319] (See appendix)

The lethality of Boer rifle and artillery fire also affected British defensive tactics. During the initial stages of the war, the British army was hesitant to employ field entrenchments, fearing a negative, defensive psychology would result. Pre-war British doctrine only acknowledged two types of field entrenchments—the 'half-hour' and 'hour' hasty positions were rudimentary earth embankments (of approximately one and one-half feet) that offered virtually no protection from high-angle fire. However, by Magersfontein British infantry were becoming accustomed to digging field works (due to sheer necessity). By wars end, British troops were constructing superb field entrenchments with

great care given to camouflage and protection from overhead fire (even though the number of Boer artillery pieces had declined). It was also realized that high-angle howitzer fire was increasingly required to reduce enemy fortifications.[320]

APPENDIX C: PART II—INTERPRETATIONS OF THE BOER WAR

Observations of Foreign Military Observers

The lessons of the Boer War were not lost on the armies of foreign nations. Several nations sent military observers to study the conflict. In his post war reports, Austrian observer Captain Robert Trimmel (1870-1959) noted the tactical evolution that had occurred within the British army. British infantry now advanced behind a protective screen of skirmishers, with mounted units assigned to screen their flanks. Small pinning forces were used to fix enemy positions in the front while mobile forces threatened the flanks. [321][322]

Captain Trimmel noted the necessity for artillery to employ cover and emphasize concealment to survive on the modern battlefield. He also noted the relatively minor effect of artillery on well-entrenched troops. Trimmel's reports emphasized the importance of fortifications in defensive positions, stating, "Experience showed that neither artillery fire nor rifle fire alone were strong enough to shake fortified defense positions enough to allow them to be taken by assault. Even weak very forces were able to produce enough firepower to stop frontal assaults in suitable terrain." This type of observation may have led to the pre-World War underestimation of artillery barrages.[323]

Trimmel's description of the 'new' flow of battle commenced with an artillery bombardment. (As previously stated, he observed that if the defenders were entrenched, the barrage usually had little affect). Meanwhile, the British deployed just outside of the effective range of Boer artillery (approximately 5,000 meters from the enemy position). The Boer infantry normally commenced individual rifle fire at 2,700 meters. However, this fire was largely ineffective due to the extended range. As the range decreased, the lethality of the Boer rifle fire was normally able to limit the advance of British infantry to 900 meters in open terrain. Accordingly, pinning forces often operated at ranges from 900 to 1,800 meters from the Boer lines. Unlike the Franco-Prussian War, even reinforcements and reserves were forced to abandon close-order formations. Mounted infantry were also forced to dismount as far as 2,700 meters to advance in relative safety.

Trimmel underscored the necessity of flanking tactics stating, "All these experiences show that frontal assaults have become impossible as it is not possible to break the firepower of an adversary who has entrenched himself."[324] Trimmel disagreed with German observers who believed that frontal attacks could still be successful if executed

according to approved regulations. In contrast, German accounts cited the battles of Elandslaagte (October 1899) and Driefontein (March 1990) as successful British frontal attacks and used them to justify their newly revised doctrine and regulations, largely based on fire-tactics.[325]

Even before the Boer War was analyzed, the Austro-Hungarian infantry manual of 1889 had declared that pure frontal assaults should only be executed if employing surprise or exceptionally suitable terrain. “In all other cases the enemy should be contained by a pinning force while the main attack should be executed as a flanking movement.” Austrian general officers noted that infantry attacks would have to advance under cover, and with the support of artillery. Later, advocates of *Burenverfahren*, or Boer attacks, claimed that assaults should be conducted by small groups of infantry advancing through a series of rushes. It was thought that these rushes, emphasizing the use of cover, would offer the best chance of success against modern firepower. One even advocated the coordination of howitzers and heavy mortars to support the infantry advance, with balloon observers to report enemy positions, noting that surprise and flank attacks should take the place of frontal assaults whenever possible. If unavoidable, a frontal attack would have to be supported by howitzer fire to be successful.[326]

A reviewer of Trimmel’s observations summarized his lessons of the Boer War with the following conclusions:

> “1. Infantry controlling an open terrain cannot be dislodged even by forces five times their own number.
>
> 2. Against entrenched infantry, even artillery fire shows little results, with the possible exception of howitzers.
>
> 3. Good camouflage is more important than strength: an invisible enemy cannot be aimed at.
>
> 4. It is definitely useful to have cavalry which can shoot, carbines and rifles being better suited to the conditions of modern warfare than the lance.
>
> 5. Attack is still the superior form of warfare, but flanking movements should replace conventional frontal assaults. Given the firepower of modern rifles, pinning forces in the front of the enemy’s position can be quite small, thereby freeing more troops for flanking operations.”[327]

In 1903, Austria issued a new infantry manual incorporating several of the observations and lessons of the Boer War. Many aspects of the manual were promising. It advocated principles such as establishing fire superiority prior to commencing an attack, the importance of reconnaissance, and the need for flexibility and initiative in both training and combat. However, several aspects of the new doctrine were dubious in relation with the lessons of the Boer War. In order to maintain a superiority of rifle fire, the Austrians

recommended executing long rushes made by large groups of infantry, rather than emphasizing small unit advances mentioned previously. The Austrians were overemphasizing troop density in order to achieve massed fire. Future conflicts would prove long rushes by dense groups of attackers were extremely vulnerable to enemy firepower. Additionally, the Austrian doctrine emphasized accurate fire, rather than rapid fire, to conserve ammunition. Ironically, most Boer successes were probably attributed to their rates of fire (rather than the accuracy of fire).[328]

One very disturbing omission was the removal of the prohibition against unsupported frontal assaults that was found in the earlier 1889 Austrian regulations. This omission was in direct contradiction to the lessons of the Boer War, where flanking attacks had been pivotal to the British army's later successes. Excluding these deficiencies, the Austrian infantry manual of 1903 was a sound tactical document for the times. Unfortunately, its strong points were never realistically incorporated into the army's practical training [329]

The German reaction to the Boer War's implications initially mirrored the British lessons learned. For example, the German revised regulations, issued in 1903, established firepower as the most decisive element in battle. The previous emphasis on the necessity of a final bayonet charge was omitted. However, as the years progressed, the German perspective showed a marked shift. By time the regulations of 1911 were published, German doctrine was once again downplaying the pre-eminence of firepower and reemphasizing the importance of tenacity, persistence, and the increased allure of the bayonet charge. The main firefight was to be conducted at ranges of approximately 800 meters. From this point, the skirmish lines were to advance by a series of rushes to overtake the enemy positions. The infantry was not restricted to wait for the artillery to achieve fire superiority.[330]

APPENDIX D: TERMS AND DEFINITIONS

Tactics & Techniques

Base of Fire—Fire placed on an enemy force or position to reduce or eliminate the enemy's capability to interfere by fire and/or movement of friendly maneuver element(s). (*FM101-5-1, MCRP 5-12C)*

Combined Arms—is the full integration of arms in such a way that to counteract one, the enemy must become more vulnerable to another. *(MCDP-1, MCRP 5-12C)*

• For the purposes of this essay, *combined arms* is used to describe the coordination, cooperation, and integration of service arms, namely infantry and artillery, to achieve the effect described above.

Fire and Movement—a technique primarily used in the assault wherein a unit or element advances by bounds or rushes, with sub-elements alternately moving and providing covering fire for other moving sub-elements. *Fire and movement* may be done by individuals (personnel or vehicles) or units (such as fire teams or squads). Usually, *fire and movement* is used only when under effective fire from the enemy because it is relatively slow and difficult to control. *(MCRP 5-12C*); the simultaneous moving and firing by men and/or vehicles. This technique is primarily used during the assault of enemy positions. *(FM 101-5-1*)

• For the purposes of this essay, *Fire and Movement* is used to describe assaults by bodies of troops advancing with no organized base of fire, or covering fire provided by alternating sections of advancing troops.

Fire and Maneuver—the process of one or more elements establishing a *base of fire* to engage the enemy, while other element(s) maneuver to an advantageous position from which to close with and destroy or capture the enemy. *(MCRP 5-12C);* the movement of forces supported by fire to achieve a position of advantage from which to destroy or threaten destruction of the enemy. *(Maneuver, FM 101-5-1)*

• Prior to WWI, the systematic delineation of separate *fire* elements and *maneuver* elements was not evidenced. True *fire and maneuver* tactics, employing designated *fire elements* and maneuver (or *shock)* elements, would not be developed until the First World War. However, the Boer and Russo-Japanese Wars did demonstrate isolated, yet not infrequent, incidences of embryonic *fire and maneuver* techniques (by employing *position*

infantry— acting as an embryonic *base of fire*—to support the maneuver of infantry attacks).

(For specifics concerning the development *fire and maneuver,* and *stormtroop* tactics, see Bradley J. Meyer, “Storm Troop Tactics,” *SAW 7123: School of Advanced Warfighting Selected Readings for Defense in Depth,* (AY 2001-02), pp. 1-49, specifically, pp. 14-20).

Fires

Covering Fire—Fire used to protect friendly troops from enemy direct fires. (*FM101-5-1)*

Destruction Fire—fire delivered for the sole purpose of destroying material objects. *(JP 1-02*)

Direct-fire—gunfire delivered on a target, using the target itself as a point of aim for either the gun or the director. *(JP 1-02*)

Indirect-Fire—fire delivered on a target that is not itself used as a point of aim for the weapons or the director. (JP *1-02*)

Marching Fire, or *Firing While in Motion*—organic fires delivered by attacking infantry while advancing. (Balck, *Tactics, vol. I,* p. 381-2)

Neutralization Fire—fire which is delivered to render the target ineffective or unusable. (*JP 102*)

Suppression Fire—fire delivered to temporarily degrade an opposing force or the performance of a weapons system below the level needed to fulfill its mission objectives. *(JP 1-02)*

Tactical Formations

Close-Order, Line and Column, or *Linear Formations*— rigid, linear formations based on the tactics of Frederick the Great and Napoleon. Traditionally, soldiers were arrayed (at a specified interval and distance) in three ranks. The first line was the *firing line,* followed by a line of *supports.* The *supports* bolstered the firing line with rifle/musket fire, and/or manpower. The last rank, the *reserves,* replaced casualties and exploited any gaps in the enemy line created by the first two lines. (Bradley J. Meyer, "Storm Troop Tactics," *SAW 7123: School of Advanced Warfighting Selected Readings for Defense in Depth*, (AY 2001-02), pp. 20-2).

Skirmish Line, Extended-Order, or *Open-Order*—an irregular infantry formation. Although essentially linear, a skirmish line does not maintain precise alignment between soldiers. Companies, platoons, sections, squads, and individual soldiers advance by a series of rushes. Soldiers are afforded the flexibility to fire, take cover, and conduct limited individual maneuver. Compared to close-order formations, the skirmish line was difficult to control in battle due to the dispersion and individual movement of troops. (Bradley J. Meyer, "Storm Troop Tactics," *SAW 7123: School of Advanced Warfighting Selected Readings for Defense in Depth*, (AY 2001-02), pp. 20-2).

Levels of War

Strategy (and the *strategic-level of war)*—defines those activities that focus directly on achieving national policy objectives. *(MCDP-1)*

Operational art (and the associated *operational-level of war)*—describes the actions that link the strategic and tactical levels. The operational level of war) deals with the art and science of winning campaigns—such as whether to engage an enemy in battle, or refuse battle in support of higher aims. *(MCDP-1)*

Tactics (and the *tactical-level of war)*—refers to the concepts and methods used to accomplish a particular mission in either combat or other military operations. Tactics focus on the application of combat power to defeat an enemy force in combat at a particular time and place. *(MCDP-1)*

Warfighting Doctrines/Philosophies

Maneuver Warfare—a warfighting philosophy that seeks to shatter the enemy's cohesion through a variety of rapid, focused, and unexpected actions which create a turbulent and rapidly deteriorating situation with which the enemy cannot cope. *(MCRP 5-12C)*

Defense-in-depth—the siting of mutually supporting defense positions designed to absorb and progressively weaken attack, prevent initial observations of the whole position by the enemy, and to allow the commander to maneuver the reserve. *(JP 1-02)*

Position Defense—the type of defense in which the bulk of the defending force is disposed in selected tactical localities where the decisive battle is to be fought. Principal reliance is placed on the ability of the forces in the defended localities to maintain their positions and to control the terrain between them. The reserve is used to add depth, to block, or restore the battle position by counterattack. *(JP 1-02)*

All above definitions were derived or directly taken from:

Joint Staff, *Joint Publication 1-02: Department of Defense Dictionary of Military and Associated Terms,* (Joint Staff, 2001), U. S. Marine Corps, *MCDP-1: Warfighting*, (Headquarters United States Marine Corps, 1997), Department of the Army, *FM101-5-1: Operational Terms and Symbols*, (Headquarters, Department of the Army, 1985), and/or U. S. Marine Corps. *MCRP-5-12C: Marine Corps Supplement to the Department of Defense Dictionary of Military and Associated Terms.* Washington D.C.: Headquarters United States Marine Corps, 1998 Historical military terminology was taken from Bradley J. Meyer, "Storm Troop Tactics," *SAW 7123: School of Advanced Warfighting Selected Readings for Defense in Depth*, (AY 2001-02), pp. 14-2; and, Balck, *Tactics, vol. I,* p. 381-2.

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[1] **Wilhelm Balck, *Development of Tactics—World War,* (General Service Schools Press, 1922), p. 9. (Hereafter, Balck, *Development of Tactics—World War).***

[2] **Balck, *Development of Tactics—World War,* p. 1; quoting the 1806 writings of Field Marshal von Gneisenau.**

[3] **Jay Stone and Erwin A. Schmidl, *The Boer War and Military Reforms,* (Atlantic Research and Publications Inc., 1988), p. 289.**

[4] **From the dust jacket of, Richard Connaughton, *The War of the Rising Sun and the Tumbling Bear: A Military History of the Russo-Japanese War 1904-5,* (Routledge, 1988), p. (rear dust jacket). (Hereafter, Connaughton, *The War of the Rising Sun and the Tumbling Bear*).**

[5] **Wilhelm Balck, *Development of Tactics—World War,* p. 9.**

[6] **Specifically, the German WW I army has been credited with the development of tactical (and operational)-level *maneuver warfare* and *combined* arms techniques such as: defense-in-depth, infiltration/stormtroop tactics, hurricane artillery barrages, etc. (See references by Gudmundsson and Lupfer). For a description of maneuver warfare and combined arms principles, see Appendix D.**

[7] **The German Wars of Unification consisted of the Prussian-Danish War of 1864, The Prussian-Austrian War of 1866 and the Franco-Prussian War of 1870-71. (Jehuda L. Wallach, *Dogma of the Battle of Annihilation: The Theories of Clausewitz and Schlieffen,* (Greenwood Publishing Group, 1986), p. 35).**

[8] **Peter Paret, "Napoleon and the Revolution in War," in *Makers of Modern Strategy from Machiavelli to the Nuclear Age,* ed. Peter Paret, (Princeton University Press, 1986), pp. 138-142.**

[9] **Although the Boer War had demonstrated the importance of dispersed infantry tactics to the British army, pre-WWI marksmanship experimentation at the *School of Musketry* at Hythe had proven the value of achieving a superiority of firepower through dense firing lines. It was commonly believed that dense formations could better provide concentrated, *mass fire*. Additionally, concerns over the reliability of soldiers in loose formations and maintaining control on the battlefield also supported the retention of dense formations. U.S. professional journals repeated these findings. (Major W. D. Bird, "Intantry Fire Tactics," *Journal of the United States Infantry Association,* April, 1906, pp. 156-8).**

[10] **James S. Corum, *The Roots of Blitzkrieg: Hans Von Seect and German Military Reform,* (University Press of Kansas, 1992), pp. 6-7; Bruce I. Gudmundsson, *Stoormtroop Tactics: Innovation in the German Army, 19141918,* (Praeger Publishing, 1989), p. 8.**

[11] **Captain Jonathan M. House, *Toward Combined Arms Warfare: A Survey of 20th-Century Tactics, Doctrine, and Organization,* (U.S. Army Command and Staff College, 1981), pp. 7-8; Paddy Griffith, *Battle Tactics of the***

Civil War, (Yale University Press, 1989), pp. 24-7 (Hereafter, Griffith, *Battle Tactics of the Civil War);* Michael Handel, "Men Against Fire: The Doctrine of the Offensive in 1914," in *Makers of Modern Strategy from Machiavelli to the Nuclear Age,* ed. Peter Paret. Princeton, (Princeton University Press, 1986), p. 511.

[12] Griffith, *Battle Tactics of the Civil War,* pp. 20-21.

Note: Griffith's introduction asserts that the American Civil War is often perceived as the "first major conflict of the industrial era" (p. 20). He cites several authors to demonstrate that this view is a common belief among scholars and historians. However, the central theme of Griffith's work disagrees with the assertion that Civil War tactics were greatly altered by firepower and technology.

[13] House, *Toward Combined Arms Warfare,* pp. 7-8; Allan R. Millet and Peter Maslowski, *For the Common Defense: A Military History of the United States of America,* The Free Press, 1984, p. 122-4; Griffith, *Civil War,* pp. 26-7; Paddy Griffith, *Forward into Battle: Fighting Tactics from Waterloo to the Near Future,* (Presidio, 1990), pp. 78-9.

Also, the American army's post-war employment of close-order tactics is illustrated by the army's post-war doctrinal texts; namely, Major General Emory Upton's, *Infantry Tactics, Double and Single Rank, adapted to American Topography and Improved Firearms.*

Notes: Although Griffith acknowledges the advent of the rifled-musket, he does not believe that it resulted in "revolutionized tactics". (Griffith, *Civil War,* p. 189) In his, *Forward into Battle,* pp. 78-9, Griffith again states that the Civil War era rifled-musket did not substantially alter the nature of combat. However, many authors, including the Alexander and House, claim that the advent of rifled musketry was decisive on the battlefield.

[14] House, *Toward Combined Arms Warfare,* p. 8.

[15] Colonel G. F. R. Henderson, C.B. Great Britain, "Tactics of the Three Arms Combined," RB 20-18: *Selected Readings in Military History: Evolution of Combined Arms Warfare,* (Combat Studies Institute, U.S. Army Command and General Staff College, 1983), pp. 34-5; direct quotations and entire observation.

(Publishers Note: Originally published in the *Encyclopedia Britannica* Supplement, 1902. Extracted from *The Science of War: A Collection of Essays and Lectures, 1891-1903,* (Longmans, Green, and Co., 1919), pp. 70-86)

[16] House, *Toward Combined Arms Warfare,* p. 8.

[17] House, *Toward Combined Arms Warfare,* pp. 8, 17; Balck, *Development of Tactics—World War,* p. 11; Gudmundsson, *On Artillery,* (Praeger, 1993), pp. 20-21.

[18] Connaughton, *The War of the Rising Sun and the Tumbling Bear,* pp. 220-1.

[19] The Russian army entered the conflict employing close-order infantry tactics and did not emphasize the massing of artillery. (Covered later in this essay).

[20] For an explanation of pre-World War I German command doctrine, see Appendix B.

[21] On Russian reliance on Dragomirow shock tactics, The Historical Section of the German General Staff, *The Russo-Japanese War,* Vol. I: *TheYalu,* trans. Lieut. Karl von Donat, German Army, (Hugh Rees, Ltd., 1908), pp. 59-60. (Hereafter, German General Staff. *The Russo-Japanese War,* Vol. I: *TheYalu);* on the German influence on the Japanese army, Connaughton, *The War of the Rising Sun and the Tumbling Bear,* p. 17; both topics covered in, Balck, *Tactics Vol. I,* p. 340-1

[22] Balck, *Development of Tactics—World War,* p. 12.

[23] Doctrinal frontages: battalion, 280 meters; regiment, 700 meters; brigade, 1,067 meters; division, 2,130 meters (German General Staff. *The Russo-Japanese War,* Vol. I: *TheYalu,* p. 60).

[24] German General Staff. *The Russo-Japanese War,* Vol. I: *TheYalu,* pp. 59-64.

[25] The Historical Section of the German General Staff. *The Russo-Japanese War,* Vol. I: *TheYalu,* p. 59.

[26] The Historical Section of the Committee of Imperial Defense, *The Official History of the Russo-Japanese War,* Vol. I, (Harrison and Sons, 1909), pp. 28. (Hereafter, *British Official History,* Part I); Lieutenant-Colonel A.

Kearsey, D.S.O, *A Study of the Strategy and Tactics of the Russo-Japanese War, 1904, Up to 24th August, Illustrating the Principles of War and the field Service Regulations*, Gale & Polden, ltd, Wellington Works, (no publication date listed), p. 4.

[27] **Captain L. Z. Soloviev, 34th East Siberian Rifle Regiment. *Actual Experiences in War: Battle Action of the Infantry; Impressions of a Company Commander.* (War Department, Office of the Chief of Staff, 1906), p. 6 for both direct quotation; pp. 6, 9-10 for paragraph information; p. 14, for rifle fire casualty statistic.**

[28] **Soloviev, pp. 9-10.**

[29] **Soloviev, pp. 26-7; German General Staff. *The Russo-Japanese War,* Vol. I: *TheYalu,* pp. 59-60.**

[30] **Soloviev claimed that not a single successful battle was fought during the Manchurian campaign without employing a bayonet charge. He also stated that the Japanese did not yield a single position at Liaoyang due to fire alone. He asserted that despite high losses from rifle and artillery fire, the Russians did not yield any positions due to firepower alone. (Soloviev, p. 23-4.)**

[31] **Soloviev, pp. 22-4; on faith in bayonet charge over firepower, German General Staff. *The Russo- Japanese War,* Vol. I: *TheYalu,* pp. 59-60; Balck, *Tactics Vol. I*, p. 382.**

[32] **Captain Carl Reichman, 17th Infantry, USA, Observer with the Russian Army, "Resume of Military Observations," RB 20-18: *Selected Readings in Military History: Evolution of Combined Arms Warfare,* (Combat Studies Institute, U.S. Army Command and General Staff College, 1983), pp. 57.**

Publisher's Note: Extracted from *Reports of Military Observers Attached to the Armies in Manchuria During the Russo-Japanese War*.

[33] ***British Official History,* Part II: *From the Battle of the Ya-lu to Liao-yang, Exclusive,* pp. 101-3.**

[34] ***British Official History,* Part V: *Sha Ho*, p. 145; Connaughton, *The War of the Rising Sun and the Tumbling Bear,* pp. 217-9.**

[35] **Connaughton, *The War of the Rising Sun and the Tumbling Bear*, pp. 217-9.**

[36] ***British Official History,* Part V: *Sha Ho*, pp. 160-1.**

[37] **General de Negrier, *Lessons of the Russo-Japanese War,* trans. E. Louis Spiers, (Hugh Rees Ltd., 1906), pp. 61-3; Richard Connaughton, *The War of the Rising Sun and the Tumbling Bear: A Military History of the Russo-Japanese War 1904-5*, (Routledge, 1988), p. 74.**

[38] ***British Official History*, Part I, pp. 23.**

[39] **Major Joseph E. Kuhn,, USA, Corps of Engineers, *Reports of Military Observers Attached to the Armies in Manchuria during the Russo-Japanese War*, Part III, (Government Printing Office for the War Department, Office of the Chief of Staff, 1906), pp. 15-17; General de Negrier, pp. 67-8, 70-1; Kearsey, *A Study of the Strategy and Tactics of the Russo-Japanese War*, pp. 4-6 (Japanese extended order interval, rushes, and use of cover); J. Colin, Commandant of the French War School, *The Transformation of War,* trans. Brevet-Major L.H.R. Pope-Hennessy, (Greenwood Press (Reprint of 1912 Hugh Rees, Ltd, London), 1977), pp. 58-9.**

[40] **Kuhn, *Reports of Military Observers Attached to the Armies in Manchuria during the Russo-Japanese War,* Part III, pp. 15-18; General de Negrier, pp. 67-8, 70-1; Kearsey, *A Study of the Strategy and Tactics of the Russo-Japanese War,* pp. 4-6 (Japanese extended order interval, rushes, and use of cover); J. Colin, Commandant of the French War School, *The Transformation of War,* trans. Brevet-Major L.H.R. Pope-Hennessy, (Greenwood Press (Reprint of 1912 Hugh Rees, Ltd, London), 1977), pp. 58-9.**

[41] **Kuhn, pp. 17-18.**

[42] **Taburno, *The Truth About the War,* (Franklin Hudson Publishing Co., 1905), pp. 31, 33; describing the Battle of Mukden.**

[43] **Soloviev, pp. 25, 27; General de Negrier, p. 63.**

[44] **Soloviev, pp. 28-9; Kuhn, pp. 228-29; Lt.-Col Edward McClernand and Capt. William V. Judson, *Reports of Military Observers Attached to the Armies in Manchuria during the Russo-Japanese War,* Part V, (Washington, D.C.: Government Printing Office for the War department; Office of the Chief of Staff, 1907), pp. 98-9; General de Negrier, p. 52.**

[45] **Kuhn, p. 16.**

[46] **A rapid Japanese pursuit resulted in the surrender of the entire Russian rear guard and the capture of twenty-one of their twenty-four supporting artillery pieces. (*British Official History,* Part I, on attack on Yalu, pp. 68-9; and Japanese pursuit, pp. 76-7).**

[47] ***British Official History,* Part I, on attack on Yalu, pp. 68-9; and Japanese pursuit, pp. 76-7; on initial Japanese extended-order interval, German General Staff. *The Russo-Japanese War,* Vol. I: *TheYalu,* p. 219; on the Japanese extended order interval, rushes, and use of cover, Kearsey, *A Study of the Strategy and Tactics of the Russo-Japanese War,* pp. 4-6; J. Colin, *The Transformation of War,* trans. Brevet-Major L.H.R. Pope-Hennessy, pp. 58-9.**

[48] ***British Official History,* Part II: *From the Battle of the Ya-lu to Liao-yang, Exclusive,* p. 107.**

[49] ***British Official History,* Part IV: *Liao-Yang,* pp. 57-8; p. 75; Connaughton, *The War of the Rising Sun and the Tumbling Bear,* p. 144.**

[50] ***British Official History,* Part V: *Sha Ho*, pp. 82-3.**

[51] **Griffith, *Forward into Battle,* p. 71; referencing General Ian Hamilton's, *A Staff Officer's Scrapbook.***

[52] ***British Official History,* Part V: *Sha Ho*, pp. 50-51; 97; German General Staff. *The Russo-Japanese War,* Vol. I: *The Battle on the Scha-ho,* 1910, pp. 128-32; Balck, *Tactics, Vol. I,* p. 343..**

[53] **The British Official History claims the skirmish line halted only once on the attack on Temple Hill (11 Oct), and between 2-3 times on the next attack (12 Oct). The German Official History states that the Temple Hill attack was conducted in a series of rushes. However, the British official History seems to agree with the description offered by General Hamilton. (See endnote for references).**

[54] ***British Official History,* Part V: *Sha Ho*, pp. 50-51; 97; German General Staff. *The Russo-Japanese War,* Vol. I: *The Battle on the Scha-ho,* 1910, pp. 128-32.**

[55] **German General Staff. *The Russo-Japanese War*, Vol. I: *The Battle on the Scha-ho,* p. 129.**

[56] **Kuhn, pp. 218-20.**

[57] **Kuhn, p. 227.**

[58] **Kuhn, p. 231.**

[59] ***U.S. Field Service Regulations, 1913,* (Article IX: Combat, par. 260-1), from *Selected Readings,* pp. 8890.**

[60] **Tim Travers, *The Killing Ground: The British Army, the Western Front and the Emergence of Modern Warfare, 1900-1918,* (Routledge, 1993), p. 48.**

[61] **Travers, p. 45; quoting General Hamilton's, *Compulsory Service* (London, 1910), pp. 121-2.**

[62] **Henderson, "Tactics of the Three Arms Combined," *Selected Readings,* p. 39.**

[63] ***U.S. Field Service Regulations, 1913,* (Article IX: Combat, par. 266), from *Selected Readings,* p. 92-3.**

[64] **Shelford Bidwell and Dominick Graham, *Fire-Power: British Army Weapons and Theories of War, 1904-1945,* (George Allen & Unwin, 1982), p. 36; quoting Imperial War Museum, Maxse papers. F.I. Maxse, "Battalion organisation" [British spelling and capitalization], *RUSI,* Vol. 56, 1912, p. 53.**

[65] **J. Colin, Commandant of the French War School, *The Transformation of War,* trans. Brevet-Major L.H.R. Pope-Hennessy, (Greenwood Press (Reprint of 1912 Hugh Rees, Ltd, London), 1977), pp. 87-8; direct quotation,**

p. 88; On the emergence of light infantry and skirmishers prior to and during the Napoleonic era, see: Hew Strachan, *European Armies and the Conduct of War*, 7th print, (Unwin Hyman, 1983), pp. 27-32; and, Gunther E. Rothenberg, *The Art of War in the Age of Napoleon*, (Indiana University Press, 1978), pp. 20-1; reference to 'horde tactics', David G. Chandler, *The Campaigns of Napoleon: The Mind and Method of History's Greatest Soldier*, (Scribner, 1966), p. 67; referring to swarm tactics, John R. Elting, *Swords Around a Throne: Napoleon's Grand Armee*, (Da Capo Press, 1997), pp. 534-5.

[66] As previously stated, seemingly valid reasons for the retention of dense infantry formations had been demonstrated by marksmanship experimentation at the British *School of Musketry* at Hythe, in addition to the existence of several social and psychological concerns. (Major W. D. Bird, "Intantry Fire Tactics," *Journal of the United States Infantry Association*, April, 1906, pp. 156-8).

[67] Soloviev, pp. 10-11.

[68] Soloviev, p. 14.

[69] Bradley J. Meyer, "Storm Troop Tactics," *SAW 7123: School of Advanced Warfighting Selected Readings for Defense in Depth*, (AY 2001-02), Marine Corps University School of Advanced Warfighting, 2001, pp. 1-49; specifically, pp. 14-20 (section 4; original document page numbers).

[70] Colonel Henderson does not specifically mention the use of machineguns, but states that rifle fire "can be controlled with the same ease as that of machine guns," leading the reader to believe he advocated the employment of machineguns in the same role. Additionally, Henderson refers to using "mechanical appliances" to control the long-range fire of the infantry rifle, probably referring to *clinometers*, used to control the angle of fire. (Henderson, "Tactics of the Three Arms Combined," *Selected Readings*, p. 38).

In contrast to Henderson's theory, Major E.H. May in 1898 wrote that long-range rifle fire from magazine rifles was tested as ineffective by British Army tests. However, in light of the accuracy of the rifle fire demonstrated in the Boer and Russo-Japanese Wars, Henderson's theory still seems valid. (Major E.S. May, R.H.A, *Field Artillery with the Other Arms*, p. 161).

[71] Henderson, "Tactics of the Three Arms Combined," *Selected Readings*, p. 38.

[72] *British Official History*, Part IV: *Liao-Yang*, pp. 57-8; p. 75.

[73] *British Official History*, Part V: *Sha Ho*, p. 96.

[74] Soloviev, p. 12; Figure 2 displays a diagram of the stated maneuver.

[75] Taburno, *The Truth About the War*, (Franklin Hudson Publishing Co., 1905), pp. 121-22.

[76] Kuhn, pp. 106-8; McClernand and Judson, *Reports of Military Observers Attached to the Armies in Manchuria during the Russo-Japanese War*, Part V, pp. 95-6.

[77] For example, General William E. DePuy summarized the difference between tactics that employed organic fires produced by the *maneuver element* while on the move (or *marching fires*), and covering fires from a separate *fire element*. (DePuy did not use the terms '*fire*' and '*maneuver*' elements). The *fire element* maintained suppressive fire to cover the movement of the *maneuver element* using organic rifle and machinegun fire. Obviously, the attack should be coordinated and supported by additional fires from mortars and artillery, if available. DePuy noted that as late as the outset of WW II, army officers incorrectly believed that *marching fires* could provide enough firepower (in and of itself) to carry an attack, rather than augmenting the fires of a supporting *base of fire* and external supporting arms. For example, General George S. Patton stated that *marching fire* was the "proper way to advance." (U.S. Army Center of Military History. *CMH Pub 70-23: Changing an Army: An Oral History of General William E. DePuy*, p. 10; Perry D. Jamieson, *Crossing the Deadly Ground: United States Army Tactics, 1865-1899*, The University of Alabama Press, 1994, pp. 147-8).

[78] On direct-fire support to final charge, Major E.S. May, R.H.A, *Field Artillery with the Other Arms: Its Employment, Illustrated from Military History, and its Re-armament with Quick-Firing Guns Discussed*, (Sampson Low, Marston & Company, 1898), pp. 48-9; on firing in motion, Balck, *Tactics, Vol. I*, p. 381-2; on marching fire, Perry D. Jamieson, *Crossing the Deadly Ground: United States Army Tactics, 1865-1899*, The University of Alabama Press, 1994, pp. 147-8.

[79] **The later acquisition of the light machine guns was aimed at providing the infantry with a man-portable, organic weapon that could suppress the enemy close in, after the supporting artillery fire was lifted. Essentially, it would give the infantry an organic weapon for use by a designated supporting *fire element* to cover the maneuver of a complimentary *maneuver* (or *shock*) element. (For a description of *fire and maneuver*, or Storm Troop tactics), see Bradley J. Meyer, "Storm Troop Tactics," *School of Advanced Warfighting Selected Readings for Defense in Depth*, Marine Corps University School of Advanced Warfighting, AY2001-02, pp. 1-49, specifically, pp. 14-20; advent of machineguns to support *stormtroop* tactics, pp. 33-4, 40).**

[80] **Bidwell and Graham, pp. 22-3; direct quotation from p. 23; on debate over light machineguns prior to WW I and their final adoption in 1917-18, pp. 49, 52.**

[81] **The *FSR* did not use the terms *fire and maneuver*, *base of fire*, or combined arms. These contemporary terms are being applied to the concepts expressed in the *FSR*.**

[82] ***U.S. Field Service Regulations, 1913,* (Article IX: Combat, par. 260,261), from *Selected Readings,* pp. *88, 90.***

[83] ***U.S. Field Service Regulations, 1913,* (Article IX: Combat, par. 261), from *Selected Readings,* p. 90.**

[84] **Once again, the specific term—*base of fire*—was not employed. However, the task assigned to *position infantry* was theoretically similar.**

[85] ***U.S. Field Service Regulations, 1913,* (Article IX: Combat, par. 261), from *Selected Readings,* pp. 90-1**

[86] **Gudmundsson, *On Artillery,* pp. 4-5.**

[87] **Gudmundsson, *On Artillery,* p. 7; Bidwell and Graham, pp. 12, 14.**

[88] **Bidwell and Graham, pp. 56-7.**

[89] **Gudmundsson, *On Artillery,* p. 21; quoting from the *Reglementprovisoire de manoeuvre de l'artillerie de campagne,* 1911.**

[90] ***Unmasked position*—guns are not concealed and have a line of sight to the target; *Masked position*—guns are concealed and do not have line of sight to the target; *Semi-masked*—a transition between the previous positions where the gun positions are concealed but a gunner in close proximity can lay the piece for direction. (Balck, *Tactics, Vol. II*, pp. 272, 324).**

[91] **Balck, *Tactics, Vol. II*, pp. 272, 324.**

[92] **Connaughton, *The War of the Rising Sun and the Tumbling Bear: A Military History of the Russo- Japanese War 1904-5,* p. 20.**

[93] **Gudmundsson, *On Artillery,* p. 20; Soloviev, p. 19; Kuhn, p. 33; de Negrier, p. 45; Warfield, "Notes on Field Artillery," from *Selected Readings,* p. 115; on the poor ability of artillery to target counter-battery fire on enemy batteries during the war, J. Taburno, pp. 119-20.**

[94] **Connaughton, *The War of the Rising Sun and the Tumbling Bear,* pp. 92-3, 96-7.**

[95] **Connaughton, *The War of the Rising Sun and the Tumbling Bear*, pp. 92-3, 96-7; *British Official History*, Part II: *From the Battle of the Ya-lu to Liao-yang, Exclusive*, pp. 38; Balck, *Tactics, Vol. I,* p. 223.**

[96] **Noting the effects of 'The Battle of Vafangu', or Telissu, de Negrier, pp. 42-3; Shelford Bidwell, and Dominick Graham. *Fire-Power: British Army Weapons and Theories of War, 1904-1945,* (George Allen & Unwin, 1982), p. 10.**

[97] **Warfield, "Notes on Field Artillery," *from Selected Readings,* p. 125: Warfield's comments concerning turn of the century artillery theory specifically address lessons from the Spanish-American War (1898-1900), but are applicable to this topic as well.**

[98] **Connaughton, *The War of the Rising Sun and the Tumbling Bear,* p. 152.**

[99] **Gudmundsson, *On Artillery,* p. 23; Colonel, H.A. Bethell, R.A., "A comparison of British, French, and**

German methods of the employment of artillery in the field (including application of fire generally), together with deductions as to the system best suited to our own army in a European campaign," *The Journal of the Royal Artillery*, August 1912, pp. 168-9.

[100] German artillery commanders, from division to battery, were given "considerable latitude" to change targets during battle. Even battery commanders could modify targets in emergency situations. (Colonel, H.A. Bethell, R.A., "A comparison of British, French, and German methods of the employment of artillery," *The Journal of the Royal Artillery*, August 1912, p. 172).

[101] Gudmundsson, *On Artillery*, p. 23; Balck, *Tactics, Vol. II*, p. 296; Bidwell and Graham, p. 11; on latitude afforded German artillery commanders, Bethell, "A comparison of British, French, and German methods of the employment of artillery," *The Journal of the Royal Artillery*, August 1912, p. 172..

[102] Gudmundsson, *On Artillery*, pp. 23-4; direct quotation from p. 24.

[103] Warfield, "Notes on Field Artillery," *from Selected Readings*, p. 114; Taburno, p. 120.

[104] Japanese had a ratio of 3 field artillery pieces per 1,000 troops as compared to 5 per 1,000 in the Russian army.

Also, the maximum range of the Japanese field artillery was 5,500 meters as opposed to the maximum Russian range of 6,400 meters. Russian guns fired 8 rounds per minute, compared to 4-5 shots per minute of the Japanese pieces. The Russian round was larger than the Japanese projectile (15 pounds vs. 11 pounds). (Kuhn, *Reports of Military Observers in Manchuria*, pp. 30-31; Lt.-Col Edward McClernand and Capt William V. Judson, *Reports of Military Observers Attached to the Armies in Manchuria during the Russo-Japanese War*, Part V, Government Printing Office for the War department; Office of the Chief of Staff, 1907, pp. 212, Taburno, p. 120).

[105] Gudmundsson, *On Artillery*, pp. 17-8.

[106] German General Staff. *The Russo-Japanese War*, Vol. I: *TheYalu*, pp. 59-64.

[107] An example of typical Russian artillery inefficiency is highlighted by the poor support rendered during the Russian counterattack at Manju Yama (3 September 1904). Although Japanese reports estimated that approximately forty guns supported the attack, a total of 152 Russian pieces were involved. However, several batteries acted independently rather than under the command of the Corps. Also, batteries ceased fire and displaced without any coordination with the needs of the infantry. (*British Official History*, Part IV, p. 98).

[108] Gudmundsson, *On Artillery*, pp. 18-19.

[109] However, one Russian observer at Mukden claimed that Japanese indirect-fire artillery, despite massive bombardments, was largely ineffective and estimated that only two percent of Russian casualties were caused by enemy artillery. This is the only reference found that disparaged the effectiveness of Japanese artillery. (Taburno, *The Truth About the War*, p. 119).

[110] Kuhn, p. 35: In terms of casualties caused by artillery, the reference compares overall Russian losses of 20% to the Japanese Second Army's losses (actually 6.99%)at Liaoyang to show that the Russian artillery was not as effective against Japanese infantry *in the field.* Japanese losses to Russian artillery during the siege of Port Arthur were estimated at twenty percent. The author cites these figures as the only reliable figures to which he had access.

[111] Gudmundsson, *On Artillery*, pp. 18-19; General de Negrier, pp. 44-5; Taburno, p. 120.

[112] The cited example occurred during the Battle of Liaoyang on 30-31 August 1904. Kuhn offers additional examples demonstrating the ability of the Japanese to effectively concentrate their artillery fires such as the attack on Chaohuatun (7 March, 1905) when the fire of 108 guns was concentrated on a single position. During the attacks on Port Arthur, the Japanese concentrated the fires of 72 pieces on the village of Shihliho on 12 October 1904. (Kuhn, *Reports of Military Observers in Manchuria*, pp. 32-3).

[113] Kuhn, pp. 32-3; Connaughton, *The War of the Rising Sun and the Tumbling Bear*, p. 151.

[114] *British Official History*, Part I, pp. 23

[115] **Soloviev, p. 18.**

[116] **Kuhn, p. 33.**

[117] **Taburno, p. 121-2, relating an incident that occurred at the Battle of Mukden.**

[118] **This tactic was successfully employed at the Battle of Telissu (14 July 1904), and is described below. (Connaughton, *The War of the Rising Sun and the Tumbling Bear*, pp. 92-3, 96-7).**

[119] **Gudmundsson, *On Artillery*, p. 20.**

[120] **Kuhn, pp. 18, 34; Soloviev, p. 17.**

[121] **Gudmundsson, *On Artillery*, p. 20; Soloviev, p. 19; In a contradictory statement, Soloviev stated that Russian artillery fire was extremely effective at silencing Japanese artillery batteries. He stated that as a result of their counter-battery fire, the Russian infantry was exposed to (relatively) light enemy artillery fire at the Battle of Mukden,.**

[122] **Kuhn, pp. 18, 34.**

[123] ***British Official History*, Part I, pp. 68-9; Kearsey, *A Study of the Strategy and Tactics of the Russo- Japanese War*, pp. 33-4; German General Staff. *The Russo-Japanese War*, Vol. I: *TheYalu*, pp. 218-9; on Corps artillery organization and placement of artillery, Connaughton, *The War of the Rising Sun and the Tumbling Bear*, pp. 54-5, 57-8, 60; War Department, Office of the Chief of Staff, Second (Military Information) Division, General Staff, *Epitome of the Russo-Japanese War*, General Staff No. 11, (Government Printing Office, 1907), pp. 6-7, 11. (Hereafter, War Department, *Epitome of the Russo-Japanese War*).**

[124] ***British Official History*, Part I, on attack on Yalu, pp. 68-9; and Japanese pursuit, pp. 76-7; on initial Japanese extended-order interval, German General Staff. *The Russo-Japanese War*, Vol. I: *TheYalu*, p. 219.**

[125] ***British Official History*, Part IV: *Liao-Yang*, pp. 22-24; direct quotation from p. 22.**

[126] ***British Official History*, Part IV: *Liao-Yang*, pp. 57-8; p. 75; Connaughton, *The War of the Rising Sun and the Tumbling Bear*, p. 144.**

[127] ***British Official History*, Part V: *Sha Ho*, p. 84; German General Staff. *The Russo-Japanese War*, Vol. I: *The Battle on the Scha-ho*, 1910, pp. 208-210.**

[128] ***British Official History*, Part V: *Sha Ho*, pp. 116-7.**

[129] **One dramatic example from the Russo-Japanese War is offered. During the Japanese attack on Liao-yang (30 August 1904), two batteries (16 guns) of the Russian 9th Artillery Brigade fired all day on a Japanese artillery position in full view of the artillery observation post. Throughout a period of two days, the Brigade fired 5,000 rounds. However, the Japanese battery continued to reply intermittently and was never put out of action for a long period of time. (*British Official History*, Part IV: *Liao-Yang*, p. 56 and footnotes).**

[130] **Gudmundsson, *On Artillery*, p. 24; Balck, *Tactics, Vol. I*, p. 353; Bidwell and Graham, pp. 11-2; on inability to destroy indirect-fire artillery positions and its effect on tactics, Captain J.G. Dooner, RFA, "Tactical Cooperation between Artillery and the other arms," *The Journal of the Royal Artillery*, May 1912, Vol. 39, number 2, p. 33; J. Colin, Commandant of the French War School, *The Transformation of War*, trans. Brevet-Major L.H.R. Pope-Hennessy, (Greenwood Press (Reprint of 1912 Hugh Rees, Ltd, London), 1977), p. 51.**

[131] **Lieutenant General Wilhelm Balck, German Army, *Tactics*, Vol. I, trans. Lt Walter Krueger, (U.S. Cavalry Association, 1915, Vol. I; 1914, Vol. II), Vol. I, pp. 353-5. (Hereafter, Balck, *Tactics, Vol. I or II);* Henderson, "Tactics of the Three Arms Combined," *Selected Readings*, pp. 37-8; On necessity of service arm coordination, Dooner, "Tactical Co-operation between Artillery and the other arms," *The Journal of the Royal Artillery*, May 1912, Vol. 39, number 2, p. 34.**

[132] **Bidwell and Graham, pp. 20-1, 27; referring to the *Field Artillery Training* manual of 1914; direct quotation, p. 20.**

[133] **Balck relates that German pre-World War I doctrine was based on the revised drill regulations of 1906.**

These regulations, though revised several times, were based on the *Drill Regulations of 1888*. (Balck, *The Development of Tactics—World War*, pp. 16, 22-3).

[134] Balck, *Tactics, Vol. I*, p. 352, quoting German F.A.D.R., Para. 364.

[135] Balck, *Tactics, Vol. I*, p. 353; Balck, *Development of Tactics—World War*, pp. 22-3.

[136] Wilhelm Balck, *Development of Tactics—World War*, pp. 22, 242.

[137] Henderson, "Tactics of the Three Arms Combined," *Selected Readings*, p. 38; "Combat," *RB 20-18: Selected Readings in Military History: Evolution of Combined Arms Warfare*, (Combat Studies Institute, U.S. Army Command and General Staff College, 1983, pp. 84-5. (Extracted from *Field Service Regulations, 1913, United States Army*, Article IX, par. 251-54, Washington D.C., Government Printing Office, 1913, pp. 158-176). Hereafter, *U.S. Field Service Regulations, 1913* from *Selected Readings.*

[138] *U.S. Field Service Regulations, 1905*, (Article VI: Combat, par. 274), from *Selected Readings*, p. 76; *U.S. Field Service Regulations, 1913*, (Article IX: Combat, par. 251), from *Selected Readings*, p. 84.

[139] *U.S. Field Service Regulations, 1913*, (Article IX: Combat, par. 251), from *Selected Readings*, p. 85; This paragraph is nearly identical to the paragraph in *U.S. Field Service Regulations, 1905*, (Article VI: Combat, par. 278), from *Selected Readings*, pp. 77, with only minor punctuation, grammatical, and semantic differences.

[140] The *FSR, 1913* does not specify direct or indirect-fire.

[141] *U.S. Field Service Regulations, 1913*, (Article IX: Combat, par. 260), from *Selected Readings*, p. 88.

[142] *U.S. Field Service Regulations, 1913*, (Article IX: Combat, par. 260), from *Selected Readings*, p. 88.

[143] *U.S. Field Service Regulations, 1913*, (Article IX: Combat, par. 258), from *Selected Readings*, pp. 86-7.

[144] *U.S. Field Service Regulations, 1913*, (Article IX: Combat, par. 258-260), from *Selected Readings*, pp. 86-9.

[145] *U.S. Field Service Regulations, 1913*, (Article IX: Combat, par. 261), from *Selected Readings*, p. 88

[146] *U.S. Field Service Regulations, 1913*, (Article IX: Combat, par. 260), from *Selected Readings*, p. 88.

[147] *U.S. Field Service Regulations, 1913*, (Article IX: Combat, par. 260), from *Selected Readings*, p. 88.

[148] *U.S. Field Service Regulations, 1913*, (Article IX: Combat, par. 261), from *Selected Readings*, pp. 90-1.

[149] Artillery was directed to fire over the heads of friendly infantry when necessary. At ranges of 5,000-6,000 yards, the artillery fire was directed to continue until friendly infantry approaches within 400 yards of the impact area. At shorter ranges, from 2,500-3,500 yards the artillery fire could continue to within 300 yards of friendly troops. One source credits the British artillery doctrine as supporting fires to within 100 yards of the friendly infantry. However, ultimately, it was left to the discretion of the infantry commander as to whether the "close support of the bursting projectile, with an occasional shrapnel or shell burst among themselves, is preferred to the full effect of the enemy's unhindered fire." (Warfield, "Notes on Field Artillery," from *Selected Readings*, p. 125; For doctrine of other nations see, Balck, *Tactics, Vol. I*, pp. 379-80, *Vol. II*, pp. 343-48; and see article by Col. H.A. Bethell, "A comparison of British, French, and German methods of the employment of artillery," *RJA*, Aug. 1912, p. 171).

[150] *U.S. Field Service Regulations, 1913*, (Article IX: Combat, par. 261-4), from *Selected Readings*, p. 91-2; Captain A. B. Warfield, Field Artillery, USA, "Notes on Field Artillery," from *RB 20-18: Selected Readings in Military History: Evolution of Combined Arms Warfare*, (Combat Studies Institute, U.S. Army Command and General Staff College, 1983), p. 125.

[151] Balck, *Tactics*, Vol. I, pp. 379-80; I am quoting Balck, not Lord Kitchener; Balck, *Tactics, Vol. II*, pp. 343-348; Techniques of close artillery support is also described in, Bethell, "A comparison of British, French, and German methods of the employment of artillery," *The Journal of the Royal Artillery*, August 1912, p. 175. Here, Bethel recommends continuing artillery fire to within 100 yards of friendly troops.

[152] Balck, *Tactics, Vol. I*, p. 380.

[153] **Kuhn, pp. 122-3, 126-127; War Department, *Epitome of the Russo-Japanese War,* pp. 29-30.**

[154] **Though viewed as ineffective by contemporary standards, the creeping barrage was considered a state of the art supporting arms procedure during the early stages of WW I. The objective of the creeping barrage was to neutralize enemy objectives to cover the advance of attacking infantry, not to destroy enemy targets. The creeping barrage technique consisted five to six successive lines of shellfire that shifted in unison to proceed the infantry advance by approximately 2,000 yards. However, primitive communications technology often resulted in divergence between the timing of the artillery barrage and the advance of the infantry. Nevertheless, the creeping barrage was found effective during the Boer War (See Appendix B), Russo-Japanese War (stated above), and the early stages of WW I. Specifically, observers noted the effectiveness of the creeping barrage at such WW I battles Neuve Chapelle (1915), Loos (1915), and at the attack on Le Sars (Somme, 1916). By 1917, the creeping barrage concept had developed into mature fire support plans supported by thousands of artillery pieces with numerous aircraft and machineguns. The 1917 Battles of Arras, Messines, and Third Ypres demonstrated 'mature' fire support coordination in the employment of massive amounts of supporting fires to assist the infantry attack. (Paddy Griffith, *Battle Tactics of the Western Front,* pp. 65-7, 85-7, 142-6).**

[155] **Connaughton, *The War of the Rising Sun and the Tumbling Bear,* p. 184.**

[156] **Kuhn, pp. 126-7; *British Official History,* Part III: *The Siege of Port Arthur,* pp. 71-2; War Department, *Epitome of the Russo-Japanese War*, p. 34.**

[157] **Kuhn, pp. 134-6 relate the 26-30 Nov. attacks; War Department, *Epitome of the Russo-Japanese War*, pp. 37-8; *British Official History*, Part III: *The Siege of Port Arthur*, pp. 81-90, describe the costly attacks, conducted in close-order throughout November, 1904.**

[158] **Kuhn, p. 138 notes the change in infantry tactics; *British Official History,* Part III: *The Siege of Port Arthur,* pp. 91-99 describe the costly attacks on 203 Meter Hill; Lieut.-Colonel Oliver E. Wood, USA, *From the Yalu to Port Arthur: An Epitome of the First Period of the Russo-Japanese War,* (Franklin Hudson Publishing Co., 1905), pp. 181-2; on attack on Hill 203, Connaughton, *The War of the Rising Sun and the Tumbling Bear,* pp. 200-1; War Department, *Epitome of the Russo-Japanese War,* p. 38.**

[159] **Kuhn, pp. 138 notes the change in infantry tactics; pp. 141-44 relate the attacks on 31 Dec 1904 - 1 Jan. 1905; *British Official History,* Part III: *The Siege of Port Arthur,* pp. 121-2, and Wood,, *From the Yalu to Port Arthur,* pp. 197-8, describe the attacks on the Wangtai.**

[160] **As previously stated the Germans in WW I eventually divided infantry assault units into *maneuver* (or *shock*) elements and *fire* elements to support the final attack. (Meyer, "Storm Troop Tactics," *School of Advanced Warfighting Selected Readings for Defense in Depth*, Marine Corps University School of Advanced Warfighting, AY2001-02, pp. 1-49, specifically, pp. 14-20).**

This advanced conceptualization was not realized during the Russo-Japanese War. However, the above listed rudimentary concepts, later encompassed by German WWI tactical advances, were evident prior to the First World War.

[161] **Earlier examples of successful employment of small-unit tactics include the Japanese assault at Yen-tao-niu-lu and La-ta-shan (12 & 13 October 1904, respectively) and the Russian attack on One Tree Hill (16 October 1904).**

[162] **Examples of the successful employment of *base of fire* techniques include: the Boer War's Battle of Driefontein (10 March 1900); and the Russo-Japanese War's assaults on the Liao-yang fords (31 August 1904), Hill 774 (12 October 1904), and the Japanese army's reliance on machinegun fire to cover the movement of troops during the Port Arthur campaign.**

[163] **Balck, *Tactics, Vol. I,* pp. 351-55, 378-81; *Vol. II,* pp. 401-9.**

[164] **Earlier cited examples and, Dooner, "Tactical Co-operation between Artillery and the other arms," *The Journal of the Royal Artillery,* May 1912, Vol. 39, number 2, pp. 37-8.**

[165] **Stone and Schmidl, p. 253.**

[166] **Travers, p. 43-5; direct quotation, p. 43.**

[167] **Direct quotation, Travers, p. 45; Paragraph information, pp. 43-49, specifically, close-order formations to maintain morale, p. 49.**

[168] **Gudmundsson, *Stormtroop Tactics*, p. 24.**

[169] **Specifically, the American *FSR, 1913* and the British pre-WW I doctrines placed heavy emphasis on the use of *position infantry* and improvement of infantry-artillery coordination. (British examples cited previously by G. F. R. Henderson). Nearly all Western army doctrines stressed the importance of infantry-artillery cooperation to support assaults against prepared positions. These early attempts to support infantry assaults with firepower demonstrate the doctrinal adoption of rudimentary *fire and maneuver* and combined arms techniques.**

[170] **Captain Jonathan M. House, *Toward Combined Arms Warfare: A Survey of 20th-Century Tactics, Doctrine, and Organization*, (U.S. Army Command and Staff College, 1981), pp. 7-8; Griffith, *Battle Tactics of the Civil War*, (Yale University Press, 1989), pp. 24-7; Michael Handel, "Men Against Fire: The Doctrine of the Offensive in 1914," in *Makers of Modern Strategy from Machiavelli to the Nuclear Age*, ed. Peter Paret. Princeton, (Princeton University Press, 1986), p. 511.**

[171] **Griffith, *Battle Tactics of the Civil War*, pp. 20-21.**

Note: Griffith's introduction asserts that the American Civil War is often perceived as the "first major conflict of the industrial era" (p. 20). He cites several authors to demonstrate that this view is a common belief among scholars and historians. However, the central theme of Griffith's work disagrees with the assertion that Civil War tactics were greatly altered by firepower and technology.

[172] **The American army's post war employment of close order tactics is illustrated by the army doctrinal texts listed in below in this essay; namely, Major General Emory Upton's, *Infantry Tactics, Double and Single Rank, adapted to American Topography and Improved Firearms.***

[173] **Captain Jonathan M. House, *Toward Combined Arms Warfare: A Survey of 20th-Century Tactics, Doctrine, and Organization*, (U.S. Army Command and Staff College, 1981), pp. 7-8; Allan R. Millet and Peter Maslowski, *For the Common Defense: A Military History of the United States of America*, The Free Press, 1984, p. 122-4; Griffith, *Civil War*, pp. 26-7; Paddy Griffith, *Forward into Battle: Fighting Tactics from Waterloo to the Near Future*, (Presidio, 1990), pp. 78-9.**

[174]**Note: Although Griffith acknowledges the advent of the rifled-musket, he does not believe that it resulted in "revolutionized tactics". (Griffith, *Civil War*, p. 189) In his, *Forward into Battle*, pp. 78-9, Griffith again states that the Civil War era rifled-musket did not substantially alter the nature of combat. However, many authors, including the Alexander and House, claim that the advent of rifled musketry was decisive on the battlefield.**

Millet and Maslowski, *For the Common Defense*, p. 123; Bevin Alexander, *Lost Victories: The Military Genius of Stonewall Jackson*, (Henry Holt and Company, 1992), pp. 2-3; Stephen E. Ambrose, *Upton and the Army*, 2nd ed., (Louisiana State University Press, 1992), p. 58.

[175] **Ambrose, p. 60.**

[176] **Perry D. Jamieson, *Crossing the Deadly Ground: United States Army Tactics, 1865-1899,(The* University of Alabama Press, 1994), pp. 1-2.**

[177] **Alexander, pp. 4-5; Ambrose, pp. 58, 81; on artillery, Millet Maslowski, *For the Common Defense*, p. 124.**

[178]**Note: As previously stated, Griffith again disputes the claim that the advent of the Minnie Ball greatly affected the tactics of the cavalry and artillery, *Civil War*, p. 189.**

Alexander, pp. 5-6: House. pp. 7-8; Ambrose, pp. 58-9; Ambrose uses the Battle of Gettysburg to demonstrate the superiority of the defense in Civil War battles, especially in terms of artillery.

[179] **Griffith, *Civil War*, pp. 60, 152.**

[180] **Ambrose, pp. 58-9.**

[181] **Though the systematic use of skirmisher tactics predated the Napoleonic era, increased troop reliability**

and morale of the nationalist armies of the French Revolution allowed expanded modes of reconnaissance, patrolling, and pursuit. Napoleon was able to exploit the tactical freedom achieved by skirmisher formations and reconnaissance parties to outpace his rigidly controlled enemies. Loosely controlled skirmisher formations depended on the initiative of the individual soldier to disorient the enemy army and screen friendly operations prior to main body's attack. Skirmishers proved an extremely useful tool, especially during Napoleon's early campaigns. (Chandler, Elting, Rothenberg; See bibliography)

[182] **Griffith, *Civil War,* pp. 99; citing General Winfield Scott's *Infantry Tactics or Rules for the Exercise and Manoeuvers of the United States Infantry* (1935) as the standard doctrine of American armies prior to the Civil War.**

[183] **Griffith, *Civil War,* pp. 100-1; citing Lieutenant Colonel William J. Hardee's, *Rifle and Light Infantry Tactics for the Exercise and Manoeuvres of Troops when acting as Light Infantry or Riflemen,* as the most widely used tactical text during the Civil War.**

[184] **Griffith, *Civil War,* pp. 155-6.**

[185] **Bruce Catton, *Grant takes Command,* 3rd ed., (Little, Brown and Co., 1994), pp. 220-21.**

[186] **Ambrose, pp. 29-31; Gregory Jaynes and the Time-Life editors, *The Killing Ground: Wilderness to Cold Harbor,* 2nd rev. ed., (Time-Life Books, Inc., 1987), pp. 89-91.**

[187] **Ambrose, pp. 31-3; Jaynes, *The Killing Ground,* pp. 90-92 (Upton's attack), 92-105 (II Corps' attack).**

[188] **Colonel G. F. R Henderson, C.B., *The Science of War: A Collection of Essays and Lectures, 1892-1903,* ed. Captain Neill Malcolm, D.S.O., (Longmans, Green, and Co., 1905), p. 149. (Hereafter, Henderson, *The Science of War*).**

[189] **Griffith, *Civil War,* pp. 103-4; Major General Emory Upton, *Infantry Tactics, Double and Single Rank, adapted to American Topography and Improved Firearms,* (Greenwood Press, NY, 1968 Reprint), pp iv. (Hereafter, Upton, *Infantry Tactics)*; Ambrose, pp. 63; Jamieson, pp. 6-10.**

Note: In the manual's foreword, the army acknowledges the fact that it covers single-rank formations "specifically adapted to the use of the breech-loaders" (p. iv), and attests that skirmisher formations are "superior for offense or defense to any existing system." (p. iv). The manual includes an entire section on orders for the deployment of skirmishers from a column formation and its advance.

[190] **Upton, *Infantry Tactics,* p. viii.**

[191] **Griffith, *Civil War,* p. 104; for specific guidance to officers and NCOs concerning skirmishers initiative and morale see Upton, *Infantry Tactics,* p. 117, 131-2; Ambrose, pp. 63-4.**

[192] **Breech-loading arms allowed soldiers to reload without moving to the rear. Therefore, a single line formation could now maintain a continuous, high rate of fire. Thus, the reduced density of a single skirmisher line would theoretically reduce casualties while still maintaining a high volume of fire in the attack. (Ambrose, *Upton and the Army,* p. 60; Jamieson, *Crossing the Deadly Ground,* p. 10).**

[193] **Major General Emory Upton, *Armies of Asia and Europe Embracing Official Reports on the Armies of Japan, China, India, Persia, Italy, Russia, Austria, Germany, France, and England,* (New York. NY: Greenwood Press, 1968; reprint of 1878 original by D. Appleton & Co), pp. 312-13. (Hereafter, Upton, *Armies of Asia);* Ambrose, pp. 60, 79; Jamieson, pp. 93-4.**

[194] **Paddy Griffith, *Forward into Battle: Fighting Tactics from Waterloo to the Near Future,* (Presidio, 1990), p. 66. (Hereafter, Griffith, *Forward into Battle***

[195] **A skirmisher squad was designated as a four-man team, not the present-day squad organization.**

162 Ambrose, pp. 64-5.

[196] **Ambrose, pp. 64-5.**

[197] **Several of Upton's observations, especially concerning the effect of breechloaders on the battlefield, were validated by the events of the Franco-Prussian War. Additionally, Upton later derived several of his tactical**

precepts by studying the Prussian Army following the War of 1870. At the tactical level he recommended that the US Army adopt the Prussian organization of a four-company battalion and the employment of the company column for the maneuver of the supports and reserves on the battlefield. Strangely, he disagreed with the Prussian doctrine of flank attacks believing that although it was successful against the inferior armies of France and Austria, it would lead to disaster if attempted against 'superior' British or Russian troops. Missing the larger implications of the Franco-Prussian War, he wrote that "no new principles in strategy or grand tactics have been established, and the only important change in minor tactics is the use of skirmishers to an extent heretofore unknown in Europe, but for which both parties would have been prepared if they had studied our civil war." (Ambrose, *Upton and the Army*, pp. 83-4).

[198] **Upton, *Armies of Asia,* pp. 315-6.**

[199] **Jamieson, *Crossing the Deadly Ground,* pp. 101-3.**

[200] **Jamieson, *Crossing the Deadly Ground,* pp. 103-5,108, direct quotation, p. 104, citing the *Army Navy Register*..**

[201] **Griffith, *Civil War,* pp. 61, 65-6.**

[202] **Jamieson, *Crossing the Deadly Ground,* pp. 7-9.**

[203] **Griffith, *Civil War,* pp. 61, 65-6; Addington, p. 4.**

[204] **Captain A. von Boguslawski (Colonel Lumley Graham, trans.), *Tactical Deductions from the War of 1870-71,* (Henry S. King & Co., 1872), pp. 56-7; Paddy Griffith, *Forward into Battle,* p. 57.**

Note: Griffith states that several observers credit the Prussian victory at Sadowa to the ability of the Prussian soldiers to fire from the prone position as a result from being equipped with the Dreyse 'needle-gun'.

[205] **Bruce I. Gudmundsson, *On Artillery,* p. 2; Griffith, *Forward into Battle,* p. 82; Bidwell and Graham, p. 1; on Dreyse 'needle-gun' and *chassepot,* Hew Strachan, *European Armies and the Conduct of War,* 7th print, (Unwin Hyman, 1983), pp. 112-3, 115; Colonel T. N. Dupuy, USA *A Genius For War: The German Army and General Staff, 1807-1945,* (Prentice Hall, 1977), pp. 76; Lieut.-Col Arthur L Wagner, USA, *The Campaign of Koniggratz: A Study of the Austro-Prussian Conflict in Light of the American Civil War,* (Hudson-Kimberly Publishing Co., 1899), pp. 19-20 (reprinted by American Military University for LW516 Course, AY 99-00).**

[206] **Wagner, *The Campaign of Koniggratz,* pp. 103-5.**

[207] **Though not stated in contemporary terms, the general observation that the lessons of the Franco-Prussian War demonstrated a need for doctrinal and tactical change is drawn from the work of Boguslawski's, *Tactical Deductions from the War of 1870-71,* pp. v-viii (Translators' Preface by Col Lumley Graham), 155-7.**

Both the author and translator describe the necessity to modify close-order tactics in light of the increase level of firepower due to rifled and breech-loading weapons. The term combined arms is used to describe the increased integration of service arms.

Also see, Strachan, on infantry transition from close-order to skirmish line, pp. 114-7, on increased importance to artillery and combined arms support to infantry, pp. 117-9.

[208] **Boguslawski, pp. 154-7.**

[209] **Although cavalry would still play an important role on the battlefield, the tactical trends of the American Civil War were confirmed. The increased vulnerability of cavalry to firepower would mean that cavalry would rarely carry out the decisive battlefield attack. The role of cavalry was now relegated to the secondary supporting roles of screening, reconnaissance, and raids. (Boguslawski, p. xv; Translator's Preface by Col Lumley Graham, 88-9).**

[210] **Boguslawski, pp. 66-7; Strachan, on infantry transition from close-order to skirmish line, pp. 114-7, on increased importance to artillery and combined arms support to infantry, pp. 117-9.**

[211] **Boguslawski, pp. 154-7; Dupuy, pp. 90-1; the definition of Napoleonic *Grand Tactics,* Chandler, *The Campaigns of Napoleon,* pp. 178-9.**

[212] **For example, at the Battle of Sedan the Germans were able to mass 80 percent of their guns, 540 total, into one Grand battery.(Gudmundsson, *On Artillery*, pp. 1-2)**

[213] **German four-pound 80mm pieces had a range of 3,800 meters as opposed to the French 86.5mm 3,150 meters. Additionally, the unreliable fusing of French ordnance prevented detonation at ranges in excess of 2,950 meters. (Gudmundsson, *On Artillery*, pp. 1-2)**

[214] **Gudmundsson, *On Artillery*, pp. 1-2.**

[215] **Captain A. B. Warfield, Field Artillery, USA, "Notes on Field Artillery," from *RB 20-18: Selected Readings in Military History: Evolution of Combined Arms Warfare*, (Combat Studies Institute, U.S. Army Command and General Staff College, 1983), p. 110. (Hereafter, Warfield, "Notes on Field Artillery," from *Selected Readings*). In comparison, Boguslawski states that the normal firing position for German artillery was from 20003000 paces from the enemy. (Boguslawski, p. 59).**

[216] **Gudmundsson, *On Artillery*, pp. 2-3; Michael Howard, *The Franco-Prussian War: The German Invasion of France, 1870-1871*, (Routledge, 1961), pp. 96 (footnote), 103.**

[217] **Gudmundsson, *On Artillery*, p. 3; quoting Prussian field artillery regulations; Balck, *Tactics, Vol.* I, pp. 352; Boguslawski, pp. 101-104, describes the Prussian practice of deploying guns well forward, even when under heavy enemy fire; also, Bethell, "A comparison of British, French, and German methods of the employment of artillery," *The Journal of the Royal Artillery*, August 1912, p. 171.**

[218] **Boguslawski, pp. viii; (Translator's Preface by Col Lumley Graham).**

[219] **Boguslawski, pp. viii (Translator's Preface by Col Lumley Graham), 76-7.**

[220] **The Prussians were organized in four company battalions with two companies deployed forward as skirmishers. The remaining two companies often remained in close-order company columns well to the rear. This formation allowed them to maneuver in any direction, over uneven terrain, while still maintaining the ease of control offered by close-order formations. (Ambrose, *Upton and the Army*, p. 83; Boguslawski, pp. 171-2)**

[221] **Boguslawski, pp. viii; (Translator's Preface by Col Lumley Graham), pp. 76-7.**

[222] **Boguslawski, pp. viii (Translator's Preface by Col Lumley Graham), 76-9, 160-1; direct quotation from p. 162.**

[223] **Boguslawski, p. 79.**

[224] **Boguslawski, pp. viii-x; (Translator's Preface by Col Lumley Graham).**

[225] **Boguslawski, pp. viii-xiii; Translator's Preface by Col Lumley Graham.**

[226] **Stone and Schmidl, pp. 252-3; Balck, *Tactics, Vol. I*, p. 75-8,**

[227] **Gudmundsson, *Stormtroop Tactics*, p. 8; Gudmundsson, "A Lesson from the Boers," Military *History Quarterly*, summer 1989, Vol. 1, number 4, p. 34.**

[228] **Henderson, *The Science of War*, p. 139.**

[229] **Henderson faulted the Prussians for disregarding the fundamentals of combat. He stated that the Prussian penchant for initiative and aggressiveness was often made at the expense of the "principles of war," claiming that the standard practice of "preparing the attack by a heavy artillery fire was habitually neglected" since the senior commanders never allowed the artillery enough time to complete their bombardments. As an example, Henderson asserts that the huge Prussian losses at Spicheren and Worth were exacerbated by the Prussian failure to allow the artillery to properly prepare the battlefield prior to the attack. The infantry attack was commenced at the same time as the artillery began its preparation fire. (Henderson, *The Science of War*, pp. 140-1)**

Additionally, he claimed that the Prussians abandoned the Napoleonic practice of advancing with infantry formations composed of three lines in order to give the formation the depth necessary to continue the attack by constantly providing reinforcements. The Prussian abandonment of this principle, he asserted, resulted in indecisive infantry actions which the Prussians strove to remedy with extended-order tactics. In fact, Henderson

claimed that the Prussian emphasis on outflanking enemy positions resulted in an over-extension of their lines, causing them to be too weak. (Henderson, *The Science of War*, pp. 144-5).

[230] **Henderson, *The Science of War*, pp. 146-7.**

[231] **Henderson, *The Science of War*, p. 164.**

[232] **Henderson, *The Science of War*, p. 164.**

[233] **Henderson, *The Science of War*, p. 142.**

[234] **Henderson, *The Science of War*, p. 152.**

[235] **Henderson, *The Science of War*, pp. 152-3.**

[236] **Henderson, *The Science of War*, pp. 372-4; direct quotation, p. 373.**

[237] **Paragraph information from Boguslawski, pp. x-xiv; Translator's Preface by Col Lumley Graham; direct quotation from p. xiii.**

[238] **Boguslawski, p. xiv; Translator's Preface by Col Lumley Graham.**

[239] **Boguslawski, p. 151.**

[240] **White, p. 139; Craig, p. 63.**

[241] **Daniel J. Hughes, ed., *Moltke on the Art of War: Selected Writings*, (Presidio Press, 1993), p. viii, from foreword by Gunther E. Rothenberg.**

[242] **Larry H. Addington, *The Blitzkrieg Era and the German General Staff, 1865-1941*, (Rutgers University Press, 1971), pp. xi, 4; Daniel J. Hughes, ed., *Moltke on the Art of War: Selected Writings*, (Presidio Press, 1993), p. viii, foreword by Gunther E. Rothenberg; Wallach, pp. 41-2.**

[243] **Addington, p. 6.**

[244] **Addington, p. 6; Boguslawski, pp. 58-60. Although the author does not attribute the doctrinal developments directly to Moltke, the realization of the strength of the tactical defense and strategic offence are cited.**

[245] **Addington, p. 4.**

[246] **Addington, pp. 1, 4, 8.**

[247] **The reference (Boguslawski) states that the Battles of Weissenburg, Worth, and Vionville were fought using this operational doctrine. It lists the Battle of Spicheren as an exception since the advanced guard became unintentionally decisively engaged upon contact with the enemy. (Boguslawski, pp. 58-60)**

[248] **Boguslawski, pp. 58-60.**

[249] **However, Boguslawski notes that it is often necessary to execute "a fairly sharp attack in front … to hold [the enemy] fast" in order to ensure that he cannot detect and reorient on the turning movement during its movement. (Boguslawski, pp. 60-61)**

[250] **Addington, pp. 1, 4, 8.**

[251] **Addington, p. 6.**

[252] **Addington, pp. 4,6; Balk, *Development of Tactics—World War*, p. 7.**

[253] **Moltke's rationale for keeping his armies dispersed until the time of battle was highlighted prior to the Battle of Könniggrätz (1866) due to logistical complications. After the juncture of the Prussian First Army with the Army of the Elbe (following the Battle of Münchengrätz), the task of supplying 100,000 men, concentrated in an area of twenty miles, proved to be extremely difficult for the Prussian supply system. The strain of this task**

confirmed the validity of Moltke's operational theory even prior to the Franco-Prussian War. (LtCol Arthur L. Wagner, *The Campaign of Koniggratz: A Study of the Austro-Prussian Conflict in Light of the American Civil War*, Hudson-Kimberly Publishing Co., 1899, p. 46).

[254] **Hughes, pp. 11-12, 56; Bradley J. Meyer, Operational Art and the German Command System in World War I. (Dissertation for Degree Doctor of Philosophy in the Graduate School of the Ohio State University, 1988), p. 4.**

[255] **Hughes, p. ix, foreword by Gunther E. Rothenberg, 124.**

[256] **Hughes, p. 76-78, 132-3; Holborn, 290-91.**

[257] **Corelli Barnett, *The Swordbearers: Supreme Command in the First World War* (Indiana University Press, 1963), p. 50; Meyer, *Operational Art and the German Command System in World War I*, p. 7.**

[258] **Meyer, *Operational Art and the German Command System in World War I*, p. 7.**

[259] **Meyer, *Operational Art and the German Command System in World War I*, pp. 1, 7.**

[260] **Meyer, *Operational Art and the German Command System in World War I* pp. 102, 109.**

[261] **Meyer, *Operational Art and the German Command System in World War I*. pp. 128-29.**

[262] **Barnett, p. 44.**

[263] **Meyer, *Operational Art and the German Command System in World War I*, pp. 130-32.**

[264] **Corum, pp. 6, 12.**

[265] **Eversley Belfield, *The Boer War*, (Archon Books, 1975), p. 30.**

[266] **Belfield, pp. 30-1; Jay Stone and Erwin A. Schmidl, *The Boer War and Military Reforms*, (Atlantic Research and Publications Inc., 1988), p. 15.**

[267] **Belfield, pp. 33, 35-6.**

[268] **Stone and Schmidl, p. 17.**

[269] **Jay Stone and Erwin A. Schmidl, *The Boer War and Military Reforms*, (Atlantic Research and Publications Inc., 1988), p. 14.**

[270] **Belfield, pp. 35-6.**

[271] **Historical Section of the Great General Staff, Berlin, *The War in South Africa*, Vol. I, trans. Vol. I, Col. W. H. H. Waters, (John Murray, 1907), pp. 24-5. (Hereafter, German General Staff, *The War in South Africa*, Vol. I or Vol. II); and, Stone and Schmidl, pp. 14-15. (referencing, G. F. R. Henderson, *Science of War).***

[272] **Specifically, British battlefield regulations directed that infantry advances be conducted by formations consisting of three lines. The first was to pin the enemy force for the assault made by the second line. The third line was to pursue the enemy or, in the case of failure, cover the retreat. Infantry fire was to be opened at 450 meters from the enemy position, as opposed to the German doctrine of 600-1000 meters. (Stone and Schmidl, *The Boer War and Military Reforms*, pp. 13-4).**

[273] **Stone and Schmidl, pp. 13-4; German General Staff, *The War in South Africa*, Vol. I, pp. 26-8.**

Note: A misprint in the first chapter of Stone and Schmidl's, *The Boer War and Military Reforms*, refers to the British Drill Book of 1986. It was assumed the author was referring to the Drill Book of 1896 referred to later in the text.

[274] **German General Staff, *The War in South Africa*, Vol. I, pp. 26-9.**

[275] **Stone and Schmidl, p. 33.**

[276] **Balck, *Development of Tactics—World War,* p. 11; Gudmundsson, *On Artillery,* pp. 20-21.**

[277] **Belfield, p. 37; Stone and Schmidl, p. 41.**

[278] **Belfield, p. 48; Balck, *Tactics Vol. I,* p. 340.**

[279] **The quarter column formation is a close-order rectangular formation. This particular formation had 90 lines of 40 men apiece, with a frontage of 45 yards by 330 yards deep. At Magersfontein, the commander planned on advancing to within 300-500 yards of the Boer positions before deploying to an extended-order formation with a frontage of 2,500 yards. (Belfield, pp. 54-9)**

[280] **Lord Methuen lost 7% of his division. Specifically, the Highland Brigade lost 60% of its officers and 37% of its ranks. (Belfield, pp. 58-9).**

[281] **Belfield, p. 54-9.**

[282] **Stone and Schmidl, pp. 42.**

[283] **Although the 1889 Drill Book advised that artillery not be employed within 1,700 yards of the enemy positions, the British artillery at Colenso moved to within 700 yards and was rendered useless by heavy rifle fire. (Stone and Schmidl, p. 44).**

[284] **Stone and Schmidl, pp. 43-4; Gudmundsson, *On Artillery,* p. 9.**

[285] **The Boer commander "Koos" de la Rey believed it was wasteful to defend strong points from defensive positions on the crest of kopjes. In such cases, defending infantry fire was directed downwards which resulted in wasteful, inaccurate "plunging fire". Additionally, once the enemy advance reached the base of the hill, the opposing infantry were often protected by a "dead zone" which offered them a relatively safe area to regroup before continuing the attack. In response to this observation, De la Rey directed his defenders to dig individual fighting positioned on plains proceeding, or the forward slope, of a defensive position. (Belfield, pp. 38-9).**

[286] **Belfield, pp. 38-9; Stone and Schmidl, pp. 34-5..**

[287] **Belfield, pp. 41-5; Stone and Schmidl, pp. 41-2.**

[288] **Stone and Schmidl, pp. 35-6.**

[289] **For principles of German defense-in depth tactics, see, Lupfer, pp. 11-21.**

[290] **Therefore, the correct balance between density and firepower had yet to be determined. Later, the correct troop density was exhibited at the Battle of Driefontein in March 1900. At Driefontein the firing line was gradually reinforced from supports during its advance. (German General Staff, *The War in South Africa,* Vol. II, p. 49).**

[291] **This was attributed to poor pre-assault reconnaissance resulting in a lack of knowledge as to the location of enemy entrenchments. (German General Staff, *The War in South Africa,* Vol. I, pp. 219-223)**

[292] **On Battle of Paardeberg, German General Staff, *The War in South Africa,* Vol. I, pp. 219-223; Footnote on Driefontein from, *The War in South Africa,* Vol. II, p. 49; on weakness of skirmish line, Balck, *Tactics, Vol. I,* p. 238..**

[293] **Stone and Schmidl, pp. 34-5.**

[294] **As previously stated, five Boer guns opposed forty-four British guns at Colenso; at Pieters Hill ten Boer pieces defended against seventy British; at Paardeberg, six Boer guns opposed ninety-one British. (Gudmundsson, *On Artillery*, p. 9.)**

[295] **The Boer heavy artillery engaged enemy at 6,000 to 10,0000 yards, medium guns at 4,000 to 6,000 yards, and light at 3,000 to 4,000 yards. All these ranges were larger than the British army was able to counter from its similar pieces. (Stone and Schmidl, pp. 34)**

[296] **Gudmundsson, On Artillery, pp. 9-10.**

[297] **Gudmundsson, On Artillery, pp. 12-3.**

[298] **A *Shanze* was approximately five feet deep with overhead cover to protect from shrapnel. In addition to emphasizing camouflage, dirt from the firing pit was piled in the rear to eliminate the silhouette. (Stone and Schmidl, pp. 34-5)**

[299] **Stone and Schmidl, pp. 34-5.**

[300] **Belfield, p. 104, 115-6, 150, 164.**

[301] **Gudmundsson, On Artillery, p. 13.**

[302] **Stone and Schmidl, p. 82; attack on Harts' Hill by series of rushes, German General Staff, *The War in South Africa*, Vol. II, p. 266; Balck, *Tactics, Vol. I*, p. 95.**

[303] **Stone and Schmidl, p. 82; Thomas Pakenham, *The Boer War*, (Random House, 1979), pp. 363, 380-2; on the initial bombardment of Hart's Hill, German General Staff, *The War in South Africa*, Vol. II, pp. 277-8. Strangely, except the initial bombardment, the German general Staff study does not mention the rolling barrage referred to by the other two sources.**

[304] **Warfield, "Notes on Field Artillery," *from Selected Readings*, p. 113; on British tendency to cease artillery fire during the infantry attack, German General Staff, *The War in South Africa*, Vol. II, p. 329.**

[305] **Each battalion had a frontage of 250 meters, with a depth of 120 meters. There were 20 paces between each line. This was a significant change over the previously used quarter column with a Brigade frontage of 45 yards by 330 yards with deployment occurring at 300-500 yards as at Magersfontein. (Stone and Schmidl, pp. 81; Belfield, pp. 54-9)**

[306] **Stone and Schmidl, pp. 81-2; German General Staff, *The War in South Africa*, Vol. II, pp. 9-10.**

[307] **German General Staff, *The War in South Africa*, Vol. II, pp. 49-51.**

[308] **Stone and Schmidl, on infantry tactics, pp. 79-80; abolishing drill positions and conservation of ammunition, pp. 116-17; on abolishing artillery reconnaissance., pp. 45, 87.**

[309] **Stone and Schmidl, pp. 84-5, 91.**

[310] **Predicted fire is defined as using indirect-fire to shoot concentrations without preliminary ranging rounds. This requires such advances as accurate maps, the assessment of meteorological conditions, accurate survey procedures, and the inclusion of the individual characteristics of each gun. (Bidwell and Graham, *Firepower*, p. 9)**

[311] **Bidwell and Graham, pp. 9-10.**

[312] **Stone and Schmidl, p. 86-7.**

[313] **Stone and Schmidl, pp. 89-90, 246; Bidwell and Graham, p. 28.**

[314] **Travers, p. 63-4; Bidwell and Graham, p. 30.**

[315] **After their experiences in the Russo-Japanese War, the Russian army followed the trend. Russian doctrine extended their skirmisher interval to two and one half to three meters. Only France maintained its reliance on dense skirmisher formations. (Balck, *Development of Tactics—World War*, pp. 201-2). However, as discussed earlier, there was resistance to thin skirmisher formations due to an associated reduction in firepower. (See Part V. Conclusion)**

[316] **Balck, *Development of Tactics—World War*, pp. 201-2.**

[317] **Stone and Schmidl, p. 82.**

[318] **Stone and Schmidl, pp. 116-7, quoting the British manual.**

[319] **Stone and Schmidl, pp. 81-2.**

[320] **Stone and Schmidl, pp. 83, 89-90.**

[321] **Trimmel also noted that regardless of advanced tactics, the Boers were still able to counter these techniques by withdrawing before becoming decisively engaged.**

[322] **Stone and Schmidl, p. 206.**

[323] **Stone and Schmidl, pp. 204-5, 207.**

[324] **Stone and Schmidl, pp. 206-7.**

[325] **Stone and Schmidl, p. 208; citing Heft 32, pp. 22, 33-4; Heft 33, pp. 100-103.**

[326] **Stone and Schmidl, pp. 245, 249-50; citing the reforms advocated by Austrian Generals such as Field Marshal Ferdinand Siedler and Major (later General) Gustav Smekal.**

[327] **Stone and Schmidl, pp. 209-10; citing an unnamed review of Trimmel's observations.**

[328] **Stone and Schmidl, pp. 247, 254-5.**

[329] **Stone and Schmidl, pp. 255-6.**

[330] **Balck, *Development of Tactics—World War*, pp. 28, 33.**