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WHAT CHANGE CAN DO FOR AN ARMY

by

COLONEL DAVID S. BLODGETT

U. S. ARMY

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ABSTRACT

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This monograph investigates the consistent presence of change as a decisive factor in the history of warfare. It asserts that the phenomenon of change, in and of itself, can be an important contributor to battlefield success.

Change can be realized as innovation in technology, environment or doctrine. Its effects are the materiel results of the innovation, the additional advantage realized before the opponent develops an effective response and the dislocating shock effect that may result from battlefield confrontation with the unexpected. Mankind as a whole is generally slow to respond to innovation, providing a period of time in which an innovator can benefit. This conservatism is reinforced by factors common to most large military organizations.

Certain conditions are necessary for an Army to capitalize on the effects of change. Many of these conditions exist in the U.S. Army today. The remainder can be developed.

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## WHAT CHANGE CAN DO FOR AN ARMY

Any search of military history for consistent and enduring themes that form the basis of military theory is made difficult by the presence of change. Persistent patterns are hard to find because every conflict is different from the others. Warfare is constantly changing. Paradoxically, this constant change is one of the few consistent patterns. This being so, it appears that change can be considered a constant. Further, its impact on history suggests that change itself can be a combat power multiplier for the soldier who understands its effects and who can harness it to his advantage.

Innovation has consistently shaped the turning points in military history. Most investigations addressing this theme, however, have concentrated on a particular era or a specific innovation. Emphasizing the effects of a particular change, they frequently ignore the role of change itself. There has been little attempt to identify the effects of controlled, progressive change as a deliberate policy.

Man's normal resistance to change is especially strong in the military profession. There is normally a long interval between invention and effective military assimilation. As an example, an effective breech loading rifle was available in 1776. Ninety years passed before it was widely used. Even then, its initial employment was constrained by tactics appropriate for the muzzle loader's limitations. Tactics appropriate for the new weapon did not come until even later.<sup>1</sup> This slow and evolutionary approach to change provides opportunity to the army that can overcome its conservatism and innovate in an expeditious but controlled manner. Opportunities for military innovation are always present, available to the soldier who regards change, in and of itself, as an element of combat power.

### The Nature of Change

Change can spring from three sources; technology, environment, and doctrine. Although each category is different, all are similar in offering opportunity to the change agent seeking advantage from them.

In this age of technological explosion, the word innovation normally elicits visions of new hardware. New machines have initiated some of the most significant changes in military history. Gunpowder, the breech-loader, the machine gun, and the directed energy weapon are all components of an ongoing chain of technological innovation.

New technology need not be truly new. An existing item may evolve until its effect is essentially new. The airplane, poison gas, and the radio were new inventions early in this century. Their impact on the First World War was limited by their primitive nature and by men's inability to free themselves from the shackles of previous experience to recognize and implement their full potential.

The early airplanes were barely suitable for reconnaissance and communications. As early pioneers recognized the potential value of other uses, they pressed to realize the possibilities. This pressure hastened the evolution of aircraft. Improved aircraft demonstrated the feasibility and desirability of additional applications. This interaction led to air to air combat, the bomber and the cargo airplane. The effects of some of the latter changes were at least as dramatic as the introduction of the first military flying machine.

The same accelerating evolution is apparent today in space. With the satellite's maturation as a communications and reconnaissance platform, there is an emerging capability for space vehicles to destroy each other. The satellite's potential for defense against ballistic missiles is clearly understood. This application is the object of a massive research and development program that has profound implications for the future of nuclear conflict.

The distinction between technological innovation and evolution is neither particularly clear nor very important. Either startlingly new inventions or glacially slow and apparently minor improvements can generate major operational changes.

Technology itself need not change to provide the basis for military change. New uses for existing tools can introduce dramatic advances. The inclined plane was in use for thousands of years before someone wrapped it around a metal rod, inventing the screw and fastening modern civilization together. The water wheel ground meal and drove machinery for centuries before Robert Fulton applied the the steam engine's energy to the other end, introducing the steam boat and a new era in transportation. Conversion of radar waves to microwave cookery and microwave cookery to lethal weapons represents new application of essentially unchanged technology. Such new applications of existing technology often provide greater results than the introduction of immature and imperfect technology.

Relatively minor changes can yield dramatic results by combining a refined technical application with the ideas of an innovator who is neither shackled by the inventor's preconceptions nor hampered by immature mechanical applications. This can be seen in the naval gunnery improvements of the early 1900's.

In those days naval gunnery was a relatively crude affair. A telescopic sight aligned the gun with the target. The distance to the target was estimated and the gun barrel elevated to achieve the required range. Being directly connected with the barrel, the sight recoiled with the barrel and could not be used during the actual discharge. The motion of the ship constantly altered the elevation of the gun with respect to the horizontal plane, effectively altering the range setting. Gunnery consisted of setting deflection with the sight, using range estimates and tables to set elevation, and then attempting to time the discharge to coincide with the ship's roll through the horizontal plane. Gunnery was not a very precise science.

An American officer named Sims became dissatisfied with the standard of gunnery. He developed the concept of continuous aim firing, using three technical innovations. None of them were startlingly new but their combination was to revolutionize naval gunnery. Sims isolated the telescopic sight from the gun barrel, enabling the gunner to use the sight through the entire firing sequence. He changed the gear ratio of the elevating mechanism

to permit easier elevation adjustment. As a result, once the elevation was properly set for range, the gunner could compensate for the ship's roll by maintaining a steady sight picture, thereby keeping the elevation constant with respect to the horizontal plan. Sims' third innovation was a sub caliber device mounted on the gun to permit frequent gunnery practice.

The effect of these seemingly minor changes was astonishing. In 1899 five ships engaged a ship sized target at 1600 yards range. After 25 minutes of continuous fire, they had achieved two hits. In 1905, using the new techniques, a single gunner engaged a 25 X 75 foot panel at the same range. He scored 15 hits in one minute.<sup>2</sup>

This was a dramatic change wrought by very minor mechanical innovations. The improvement in gunnery was greater because there was no need to struggle with the imperfections of new machinery. There was no necessity to impose radical changes on gun crews. Gunners did very little that was different. In fact, Sims got his original idea as he watched one of his best gunners instinctively adjust the elevation wheel to compensate for the roll of the ship.

The environment is the second major source of change. Men have little influence over the environment. The soldier's choice is usually limited to whether or how to respond to the newly changed world.

The World War II Battle of the Bulge provides an excellent example of environmental change. Heavy cloud cover early in the battle permitted Germany's offensive to begin unhampered by Allied air power. The return of good flying weather is generally considered to have been a key factor in defeating the offensive.

Changes in the environment are not necessarily physical. Less material alterations may create sweeping effects. Prior to the French Revolution, warfare in Europe was limited in scope. Small, but highly disciplined professional armies fought a uniquely limited style of warfare. Units were maneuvered about the battlefield using a complicated series of drills that

could only be mastered through extended training and iron discipline. Only professional standing armies could maintain the required skills. Being expensive, such armies were, of necessity, small. The investment in training soldiers was so great that there was a reluctance to expend them in battle. This reluctance led to the ascendance of the general whose forte was the bloodless battle. To these men, the height of military skill was to maneuver their forces to secure such an advantage that the enemy recognized the inevitability of defeat and conceded the battle without actual conflict. As long as the opposing commanders were governed by the same considerations, it was relatively easy to achieve agreement that one or the other had the advantage and to negotiate peace without massive bloodshed.

The French Revolution brought societal changes to Europe that made the old style of warfare impossible. Purges of the aristocracy eliminated most of the French Army's officers. As these leaders disappeared, France lost the ability to train her army in the conventional manner. The revolutionary spirit resulted in the French soldier's refusal to submit to the discipline required for men to expose themselves to murderous fire while performing the evolutions then in vogue. These changes could and nearly did lead to military disaster.

These same societal changes transformed warfare, facilitated the rise of Napoleon and almost led to French domination of Europe. The revolutionary spirit that made traditional disciplinary standards impossible also reduced the need for iron discipline. The French soldier was now fighting for a personal cause. He was prepared to commit his life to it. The French soldier threw himself into battle with an unprecedented fervor. Warfare, previously conducted to serve the whims of monarchs, became the executor of the people's cause. Leaders who understood the change abandoned the old tactics. They developed methods made possible by the new fervor, commitment and individual initiative. These methods made the stylized conventional combat obsolete. The changes were not confined to simplified tactics and greater battlefield initiative. Since fear of mass desertion no longer prohibited individual movement, foraging became possible. The army could now live partially off the

land. It could travel lighter, farther, and faster than when it depended on a system of magazines and massive supply columns. These new features greatly increased the nation's potential combat power.<sup>3</sup>

The third source of military change is doctrine. Available technology; the physical, social, and cultural environment; and tradition all influence an army's doctrine. As a general rule, military men tend to be conservative, resisting change. Dupuy argues that imbalances between technology and doctrine result from this resistance to change and mark the decisive turning points in military history. Using the First World War to illustrate his point, he describes major advances in weapons, communications and fire control. He attributes the bloody stalemate in France to the initial failure of both sides to recognize the fundamentally changed nature of battle and to implement suitable doctrinal changes.<sup>4</sup>

The Germans were the first to change their doctrine, implementing major defensive changes. Abandoning the costly static defense of a forward trench line, they developed the defense in depth, featuring reverse slope techniques and strong, mobile counter attacks. They followed their defensive innovations with a new offensive doctrine. This approach replaced massive artillery preparations and the frontal attack with infiltration tactics, emphasis on finding and penetrating weak points, and rapid exploitation of penetrations to maintain the momentum of the attack. Although these changes came too late to win the war, they gave the German army notable battlefield success. It was more than a year before the Allies developed effective counter tactics.<sup>5</sup>

#### The Effects of Change

Change manifests itself in many ways and is derived from many sources. Whatever the source, change is only important when it provides a significant advantage. The change itself is only the means to the effect. These effects appear in three forms; the material result produced by the innovation, the additional advantage realized while the opponent develops an effective response, and the dislocating shock that may result from sudden confrontation with the totally unexpected.

Few changes are implemented unless they hold the promise of a lasting intrinsic effect. If the change, in and of itself, does not increase an army's effectiveness or nullify an opponent's advantage, it is usually worth neither the effort and nor the risks inherent in its implementation. Change simply for the sake of change can easily be counter productive, although there are exceptions. A programmed series of changes designed to throw an enemy off balance and keep him there may justify continuous change. Even in this case, the program is likely to be far more effective if each successive change carries some intrinsic benefit.

Since it demonstrates all three effects of change, the tank provides a good, if overworked, example. The tank itself provides an inherent combat advantage. More than 70 years have passed since its first appearance in battle. Even now, after all the effort that has been devoted to anti tank warfare, the tank still brings a unique combination of lethality, mobility and protection to warfare. The intensity of combat, the results of operations, and the effect that a relatively few tank crew men can have are all markedly different from situations in which there are no tanks.

The second advantage to be gained from an innovation is material but transitory. This is realized in the interval between initial use and the opponent's implementation of a counter. During this period the material effects of the change are greatest because the enemy can not respond effectively. This is the most likely period for the innovation to yield decisive results.

During the First World War, combat was dominated by the machine gun, indirect artillery fire and the trench. The primary combatants were infantry and artillerymen. Direct fire weapons needed only to kill unprotected men. Anything larger was an unnecessary burden to the soldier and the logistic system. In this environment the tank had the potential, but only that, to be a war winner. When it was first introduced, it was essentially impervious to the direct fire weapons opposing it. Although the tank was vulnerable to artillery rounds, indirect fire did not present a serious threat because of

the low probability of a direct hit. Only direct artillery fire seemed able to destroy the tank. The relative immobility of the artillery and the vulnerability of the gun crews nullified much of this antitank potential.

There was no effective answer to the tank. It had the potential to be decisive. For several reasons, it was not. First, it was mechanically fragile. The reality barely approximated the promise. Second, the Allies did not obtain full benefit from the limited capability. They failed to use the tank corps to its best advantage and they failed to exploit successes as they might. These shortcomings are common with innovation. They provide one of the basic reasons that intelligent control of change can actually be a component of combat power. Be that as it may, the tank's potential contribution was greater during its initial introduction, when the enemy had no effective counter.

The third general effect of change is simultaneously the most dramatic and the most transitory. When men are mentally unprepared for a threatening event, especially if no protective response is apparent, the result can be devastating. This is the equivalent of total surprise. It can cause whole units to break, throwing down their arms and fleeing in panic. It is the dream (and nightmare) of every commander. Although such effects are sought, they must be incorporated into plans only as a contingency. Totally debilitating surprise cannot be a requirement for success because its occurrence is neither assurable nor predictable.

This surprise is so devastating because it is totally different from of anything the victim had previously imagined. His inability to counter the new event is inextricably intertwined with this effect. Given some sort of apparently useful response, debilitation quickly disappears. Even without an effective countermeasure, the surprise effects eventually dissipate. Men learn to accept the new phenomenon. They recover their ability to function and the initial mental devastation has passed.

As with the other effects of change, the tank provides an excellent example of this transitory shock effect. Even today, when tanks are commonplace and tank killing a primary focus of the soldier's training, the first encounter with an opposing tank can generate emotional responses that most would prefer to keep between themselves and their Maker. These emotions pass and the soldier steels himself to a new level of stress. He overcomes his early reactions and becomes an effective fighting man again.

#### Human Response to Change

Like change itself, men's reactions to change are complex. Mankind lives in a state of tension, caught between the conservative affinity for the familiar and the inquisitive urge to explore. One is the source of progress, the root cause of civilization's advance. The other is a stabilizing factor. It protects society from the destructive notions of the lunatic fringe. These two tendencies provide the backdrop against which innovators contend with conservators to create progress without chaos.

The opportunities for change are always present. Especially now in the technological explosion of the late Twentieth Century, change opportunities abound. Change is occurring whether men will it or not. In such circumstances, the conservative who clings to the old and familiar is implicitly hoping that his enemies will do the same. Ultimately he has placed himself at the mercy of an enemy who is willing and able to innovate.

We generally understand that men may fail to recognize opportunities for innovation. Less obviously, the very fact that change has already occurred can pass unnoticed. Fixed in their concept of the nature of things, men tend to interpret events to fit their preconceptions. This could be termed "The Flat Earth Syndrome." If convinced that the world is flat, one's entire concept of the universe is shaped to fit. Mathematics yields formulas that accurately predict the movement of stars around a flat earth. Explorers must take precautions against falling off the edge, and so forth. With that as your concept, you are unlikely to attempt to get to the East by traveling West. Anyone who claims to have done so must be either a liar or insane.

In a similar vein, the Generals of the First World War could not see that fundamental changes had occurred to the nature of combat. They knew that war is a bloody affair. They had been hearing that modern weapons made it too terrible to be continued since the days of Napoleon. Rather than an abrupt change in the nature of warfare, this was a subtle and slowly evolving reality that the leaders had heard throughout their careers, analyzed and dealt with in the best way they could.<sup>6</sup> They failed to recognize that combat had finally changed beyond the scope of the old understanding. This was an opportunity for innovators to recognize opportunity, develop new solutions and reap benefits from them.

Even when the fact of change has been recognized or the need to do so accepted, thoughtful men may easily misunderstand the circumstances. Misinterpretation can do as much damage as failure to see. Occasionally, such misinterpretation and the results of a misguided adjustment may do more harm than if there had been no compensating adjustment at all.

The English longbow is popularly credited with the demise of the armored knight. At the Battle of Crecy in 1346, British archers won a decisive victory over the French whose tactics were limited to repeated charges by large masses of mounted knights. The French attributed their defeat to the solid body of dismounted British knights drawn up in front of the archers. Resolving not to make the same mistake again, in 1356 the French king dismounted his horsemen at Poitiers to attack an English force arrayed on a hill. This time there were no repeated cavalry charges. The mass of dismounted French nobility were probably defeated by exhaustion as they gallantly charged the hill in full armor. The English archers slaughtered them in a defeat more one-sided than Crecy. The same sequence was repeated nearly 70 years later at Agincourt. Apparently now convinced of the superiority of dismounted combat, the French knights again sent their horses to the rear. Again they attacked on foot, in full armor, against a defending British force strong in archers. Again the English bowmen slaughtered the French army.<sup>7</sup> By misreading the situation the French made matters worse, adopting a tactic that placed them at an even greater disadvantage. Perhaps the change was an improvement from the horses' point of view.

Recognition of the need to change in an unfavorable situation is a creditable achievement. When such recognition is accompanied by the intelligent implementation of an appropriate change, an institution has demonstrated the ability to survive in a changing world. The German tactical innovations of World War I are an excellent example of this. Although the fact that Germany lost the war clouds the issue, the case is strong. The tactical doctrine that Germany developed, assimilated and implemented in response to the stalemate of trench warfare was clearly successful. German tactical achievements were gaining an ascendancy when other factors ended the war.

Although slow in coming, the Allied reactions to the German World War II blitzkrieg provide more examples of adaptation. The Russians, among the first true pioneers of mechanized warfare, had lost their leadership in Stalin's purges. The British and Americans had never fully accepted the concept of mechanized warfare. While each country had some armored capability and each had its share of tank advocates, only with the fall of France did they realize that warfare was radically different. From this late start they were able to develop their own armored capability and eventually defeat the German Army.

While the ability to adapt to new circumstances is an important survival mechanism, it is only that. By its very nature the process surrenders the initiative. It allows someone else to set the terms of battle. The army that places itself in a reactive mode starts out at a disadvantage. By taking the initiative, on the other hand, it can control events. Implementation of armored warfare provided Germany an advantage that was out of all proportion to the extremely weak force she initially could field. All the way through the invasion of France, Germany achieved her conquests with numerically inferior forces and technically inferior equipment. By seizing the initiative and setting the terms of combat, Germany applied changes that overwhelmed opponents before they could regain their balance and develop effective counter tactics.

The innovations in naval gunnery in the early 1900's provided at least as great as actual change in combat effectiveness as did the blitzkrieg. These changes did not produce similar changes in world history because all naval powers had adopted similar techniques by the time they were actually used in combat. As a result, while the intensity of combat was substantially increased, there was no great disparity in capability. There was also no dislocating shock such as might have occurred if one combatant fleet had suddenly displayed a previously unknown standard of gunnery.

The English longbow, Prussian needle gun and atomic bomb were all technical innovations that achieved success out of proportion to their actual combat power. This was possible because each was integrated effectively into the user's system. Each was implemented unexpectedly and achieved its purpose before the opponent could overcome his initial shock or devise an effective counter.

#### Resistance to Change

Considering the role change has played in shaping the course of history, one might expect innovation to be almost a fetish among men. For some men, of course, it is, but the natural tendency among humans seems to be just the opposite. Progress is a painful process. Resistance to major innovations can be immense with rational argument totally useless. A society will not voluntarily accept innovations unless constant change has been generally accepted as the normal course of events, as in the electronics industry.

This resistance to change is a legitimate survival instinct. Faced with the opportunity to move out of his cave into a straw hut closer to the water and the hunting grounds, early man may not have been able to see the second order benefits; the ability to travel farther taking his shelter with him, the potential for larger tribes no longer limited by cave capacity and so forth. On the other hand, he may not have been able to foresee all the disadvantages of exposure to drafts and sickness, extra work building and rebuilding these artificial caves, and increased vulnerability to predatory animals. He could

envision some of them, however, and sense that there were others. Whatever the disadvantages of the cave, he had learned to live with them. He had survived quite nicely as he was, thank you, and saw no reason to change now.

Such conservatism probably did contribute to the survival of mankind. Progressive experiments were left to the few with a pioneering spirit. The failures resulted in the innovator, not the whole tribe, ending as a saber toothed tiger's lunch.

There are three possible outcomes of an innovation. All of them have unpleasant consequences, even when the change is successful. A successful innovation makes current methods of doing things obsolete. It changes the old patterns and makes people uncomfortable, especially those with the most psychic capital invested in the old way. Since those with the most invested tend to be those in control, there is strong incentive to resist change. Second, the innovation may be a failure. Finally, it may work but with unforeseen consequences and new problems.<sup>8</sup> Small wonder that there is great resistance to change.

While this conservative tendency is understandable, it can be difficult to accept. To the man who has committed himself to some innovation, acceptance may be impossible. As Liddell Hart notes, there is a difference between the roles of the prophet and the leader. One envisions what might be and articulates it, placing a guidepost on the horizon. The other must be a philosophical strategist, compromising between his vision of the future and men's receptivity to it. "The prophets must be stoned; that is their lot, and the test of their self fulfillment. . . . But a leader who is stoned has failed in his function." He has shifted from the role of leader to that of prophet.<sup>9</sup>

Both prophet and leader seem to be necessary in the change process. It is not often that one man may perform both roles simultaneously. The talents and mental orientation required to innovate are quite different from those needed

to shape opinion and influence people. While one man may be capable of both processes, he would be somewhat unusual. It is even more unusual to find a man successfully performing both functions simultaneously.

The introduction of pasteurization to the United States provides an example of the seemingly irrational resistance a change agent must overcome. Pasteurization was developed in France to control the aging of wine. In Germany it was used to stop the fermentation of beer and to keep milk from spoiling. The Europeans recognized that the process reduced the incidence of certain diseases and generally understood that it did so by killing the disease "microbes".

Pasteurization had been introduced into the United States but not for disease control. The growth of the cities had separated the dairy farm from its customers. The dairy industry turned to pasteurization to prevent milk in transit from spoiling. The disease prevention features were used as an argument to convince the milk drinking public that pasteurized milk was at least as good as raw milk. There was no sale. Pasteurized milk had a different taste. Customers objected to drinking milk that had all those dead microbe bodies in it. In the United States, pasteurization survived only in secret, used surreptitiously by dairymen to keep their product from souring before it had been transported to market and sold.

A wealthy American learned of pasteurization's health benefits. Philanthropically, he opened a pasteurized milk facility in the slum neighborhood where he was raised. The store was an initial failure. No one would buy pasteurized milk. Unwilling to admit defeat, the philanthropist gave free pasteurized milk to all the occupants of one city block he could convince to accept it. He encouraged an adjacent block to continue their normal eating habits. The health records he kept demonstrated a significant difference in disease rates. He proved his case, although not necessarily to the citizens. His demonstrative experiment led to the creation of laws requiring pasteurization, probably over the objections of consumers.<sup>10</sup>

## Innovation and the Professional Soldier

It might seem that military men would be more receptive to innovation than their civilian counterparts. The long periods between wars seem ideally suited for introspection, study, and progress. Failure in battle is potentially so devastating that one might expect soldiers to devote deep and prolonged study to the art and science of war, determined to make the best possible preparations for future conflict.

All of these perceptions are accurate. Armies devote great effort to being prepared to fight, to learning the best techniques and fielding the most modern equipment. Why then, is history replete with examples of military inability to change with the times? There are a number of reasons why change can be even more difficult for warriors than it is for mankind in general. They range from the very nature of war itself to the kinds of people who are attracted to the military professions.

War occurs infrequently. Most of the soldier's career is spent at peace. Only a few of the senior officers in World War I had experienced combat, and that was many years earlier. Their frame of reference was so technologically remote that it was more hindrance than help to understanding the present war. A similarly small number of the World War II leaders had seen combat in World War I. It is likely that Dwight Eisenhower never heard a shot fired in anger before he found himself Supreme Allied Commander. Those who did have combat experience acquired it in conflict that was technically and tactically very different from the conditions of the 1940's.

In civilian industry, there is constant progress. Business and manufacturing are carried on continually, year in and year out. Since there is constant activity, there is constant opportunity to try new things under the conditions of actual use. Enhancements are applied in small segments, as they are developed. The men who decide whether or not to adapt them are engaged in ongoing business. They are experts in their particular fields by virtue of continuous practice. They tend to be comfortable and confident in the knowledge of that expertise.

The military leader has a totally different set of problems. Although he, too, is a professional, he has comparatively little experience in the actual practice of his profession. The actual combat experience he does have is frequently far removed in time and acquired at a very different level of his profession from the one at which he now operates. In the interim, technical advances and tactical thought have both advanced significantly. The pressures to innovate cautiously if at all are very strong. The leader who can combine the confidence and courage to innovate with the understanding to apply the right changes is not a common man.

Man can stand only a limited amount of uncertainty and confusion. Society was shaped by men imposing order on their chaotic environment. In war, uncertainty and chaos reign virtually supreme. To enable soldiers to cope with the chaos armies go to great lengths to establish simplicity, order, and routine. Habit, routine, drill and rituals reduce the actual disorder and perform an important psychic function. They reduce the soldier's sense of chaos. They provide an aura of stability and control that becomes the frame of reference a man can cling to when all around him is out of control.<sup>11</sup> This need for stability and routine certainly contributes to military resistance to change.

The need for order and continuity is probably the best explanation for the survival of dismounted drill and ceremonies long after their utility in battle has disappeared. In the late 18th and early 19th centuries, armies maneuvered and fought using the evolutions we have retained on the parade ground. Those evolutions were last appropriate for combat during the War of 1812. They were discarded during the Civil War. Yet we persist in preserving their form, devoting effort and training time to skills that have no place in modern conflict. We do it in the name of discipline, teamwork, tradition and inspiration. Our ceremonies do reinforce all these things but so would drills oriented to modern battlefield skills. If Baron Von Steuben were able to observe our ritual preservation of the formerly practical battle drills he taught at Valley Forge, he could but shake his head in amused wonder.

This perpetuation of ritual suggests another reason for military resistance to change. In his investigation of a continuing theme of disfunctional conservatism, inaction and general incompetence among military leaders, Norman Dixon studied the careers of general officers who were successful in combat and contrasted them with generals who served in similar positions but who failed. His findings are controversial, possibly because they strike uncomfortably close to home. Dixon identified a personality type which is drawn to the neatness and order of the military profession. This type gravitates toward an environment which emphasizes rules and strict deference to the prerogatives of the hierarchy. It tends to succeed in the military environment because it thrives on the aforementioned characteristics, rising to the top and reinforcing the behavior patterns that created success in the first place.

Fear of failure, rather than desire to succeed, motivates this personality type. Strong internal pressures influence these people to avoid action and minimize the risk of looking bad. When failure appears imminent, they devote their energies to shedding the blame and passing responsibility to others.<sup>12</sup>

To the extent that this is true, and Dixon certainly presents voluminous documentation, some of the people who rise to positions of military authority are change inhibitors. They are averse to assuming the risks inherent in any innovation. Worse, their deep seated need for stability, ritual and neatness sets them almost automatically against any innovation simply because it is a change.

#### The Obscurity of Cause and Effect

As if those problems were not enough, it is extremely difficult to determine the results of an innovation. Cause and effect are obscure in the dynamic environment of combat. Despite the investment of great time and effort, the ability to simulate conflict in a test environment remains elusive.

During actual conflict, soldiers are much too busy for the niceties of scientific experimentation. Immersed in actual military operations, they are fully employed trying to convert the combined wisdom of their peacetime education, their previous experience and their common sense into workable solutions to battlefield problems. These problems are always different from the expected and the consequences of failure are frequently disastrous.

In this environment, determination of cause and effect is not the first problem the experimenter must overcome. The seemingly simple description of actual events is the first stumbling block. Like the blind men who touch different parts of an elephant and form differing opinions about the nature of the animal, different observers see the same events differently.

The difficulty of divining the actual course of events is evident in the varying accounts of one particular engagement in the Battle of Vimiero during Wellington's Peninsular campaigns. An account written in 1962 describes how the firepower of the British line devastated a French column as the British slowly advanced the flanks of the line around the column. The author's account is intended to demonstrate the devastating firepower of the British line's musketry. However, Wellington, the overall British commander, wrote that the French were driven back by the bayonets of the 50th Regiment. Rifleman Harris, a participant, described how the regiment charged grandly, whereupon the French turned and fled. The left flank brigade commander reported that the 50th Regiment's bold attack defeated the enemy. The 50th's commander recalled the French being shaken by artillery fire and pausing before resuming their advance. The 50th then moved forward out of defilade. Two of its companies fired a partial volley and the regiment charged the French flank.<sup>13</sup> Obviously some of these accounts are misleading if not simply incorrect. In any event, it is difficult to see how the first (1962) author substantiates this action as proof of the devastating firepower of the British line.

Even if we make the dangerous assumption that we have an accurate account of what has happened, we still must determine why it happened that way. War is not a controlled experiment. Any number of variables affect the outcome of

an engagement, most of them beyond the experimenter's control. Some can have effects that are decisive even though the cause is not observable. Others may be apparent but their relative importance undeterminable.

The French experience with the English longbow is a classic example of the difficulty of linking battlefield cause and effect. Today the correct interpretation appears simple. Archery had evolved until its accuracy and lethality exceeded the protective characteristics of armor. The English recognized the change and adopted tactics that capitalized on the new capability. That this was not patently obvious at the time is demonstrated by the fact that 70 years after their initial defeat by English archers at Crecy, the French still clung to the belief that English armies could be defeated by men in armor if those men dismounted and fought on foot. Told as simply as we learn the story today, it seems incredible that men could persist in such obvious and disastrous folly for so long.

We, however, have benefitted from hundreds of years of (mostly English) historians extolling the supremacy of the English yeoman and his longbow. To the participants of those battles, things were not so obvious. Many factors influenced the outcome, and the decisive factor logically could and obviously did appear to be something else. In one, the dead horses of the initial attack blocked subsequent charges. This probably led to the doctrine of fighting on foot. Again, an overeager vanguard initiated the assault against the French king's orders, before all was ready. Were it not for that, the doctrine might have worked or so it must seem to a French commander. Excessive heat, ankle deep mud and a host of other factors contributed to those French defeats at one time or another. The supremacy of the longbow was not as obvious then as it is to us today. We hear the accounts in simple terms with the moral nicely pointed.

The situation is quite different in peace time, but the differences do not make it easier to discern the issues of cause and effect on some future battlefield. During peace there is time to consider, to hypothesize and to test. There is, however, no laboratory that can accurately simulate the combat environment. Lack of realism renders all but the simplest experiments

and tests questionable. Occasionally an issue is so important that it is deemed worthy of the most realistic evaluation possible. As such an evaluation approaches the complex reality of war, the war time problems come flooding back. Things become so complex that cause and effect cannot be isolated. Critical events are shaped by factors whose importance can not be properly assessed and which may not even be recorded.

The men who must determine the future configuration of fighting forces are more or less aware of these limitations. They are also aware that each war is different. Their experience was shaped by the last war. These factors are a very unsteady foundation from which to launch bold new departures. It should not be surprising then if peace time decisions regarding military innovations tend to be very conservative.

In either peace or war the "flat earth" syndrome clouds vision and inhibits change. Having developed a frame of reference it is extremely difficult for men to accept even conclusive proof that the frame of reference must change. The fact that the armored horseman was the focal point of both war and French society made it more difficult for the French to see that the old way was passing and the knight was now vulnerable to mere peasants. The same syndrome surely helped to convince the infantry and artillerymen of the 1920's that tanks could never be more than useful infantry support weapons. It is helping today's tank proponents to "know" that air mechanization can never supplant ground armored combat.

#### Innovation Management

The factors which militate against change seem almost overwhelming. Especially in military organizations, the pressures to maintain the status quo are not always logical but they are always present. Their presence virtually ensures delay between the time that a change is technically possible and its implementation. In some cases it is even possible to predict how long it will take a particular opponent to effect such a change.

This predictability is the basis for the advantages available to any military organization capable of managing the introduction of change. The benefits derived from an intelligently implemented innovation include all three of the major effects of change. The innovator profits from the enhanced combat capability inherent in the change itself, unrelated to any novelty or surprise effects. To this benefit is added the advantage available while the opponent develops countermeasures. Finally the unpredictable shock effect of total surprise can sometimes be decisive.

Change transpires slowly in most armies but it does transpire. During some periods, it seems to have been easier to effect than in others. Some armies have shown a greater affinity for innovation than others. Some have been better able to manage change than their neighbors. The circumstances that led to rapid innovation are worth investigation.

There are common patterns in the circumstances under which various armies have overcome their conservatism and instituted sweeping changes. The perception of great danger is commonly present. A major defeat has frequently led to major systemic change. Such sweeping reforms normally occur when the defeat did not crush the confidence and self respect of the military leaders.

The preceding factors may well lead to the acceptance of change. They are, however, reactive. Most of the cases characterized by these features have been traumatic institutional departures from normal patterns. With the crisis over, the old conservatism has normally returned. These cases tell us little about the implementation of change when it was appropriate but not forced by events. They say little about an army's ability to make intelligent choices about the nature and extent of innovation. They offer little insight into the ability to manage innovation without major disfunction.

There has been one army that has consistently identified and implemented change as a matter of policy. The Germans have been notable for their pursuit of advantage through innovation. Their ability to manage innovation has been at least as significant as their ability to decide to change.

German implementation of infiltration techniques to replace the unsuccessful frontal assaults of World War I provides an excellent example. A Frenchman named Laffargue wrote a booklet entitled "The Attack in Trench Warfare." This booklet contained the outline of a totally new approach to offensive operations. The French disseminated the booklet as interesting information. They did not adopt the techniques as doctrine and the booklet was virtually ignored. If the British were ever aware of the booklet, they were not interested enough to translate it. Like the French, they did not benefit from Laffargue's ideas.

The Germans had a habit of searching for good ideas and using them to their advantage. They captured the booklet, translated it, and issued it to all units. Many of the ideas it contained were included in the new system of offensive doctrine that the German Army developed, trained itself to use and implemented with excellent results. All three armies had been caught in the same defensive stalemate. Only the Germans put the new ideas to effective use, achieving notable tactical success.<sup>14</sup>

The German Army repeated this process as it prepared for World War II. They had not emphasized the tank in the First World War. Even though other armies had more combat experience with tanks and the primary proponents of armored warfare were from other countries, only the German Army recognized the full potential. They developed a system that fulfilled the promise of the early prophets and nearly conquered Europe. The Germans had a mechanism to identify the need for change and implement it in an effective manner. This was one of the primary functions of the German General Staff.

Studying the change process, General Starry identified a set of generalized prerequisites for effecting change:

- An institution to identify the need, design the parameters for change, and describe what is to be done.

- A shared educational background among the principal command and staff personalities sufficient to produce a common cultural bias to the solution of problems and a stable framework within which change may be implemented without disrupting the entire fabric and continuity of the system.
- A spokesman for change; a person, an institution, or a staff agency.
- A process for building consensus that gives the new idea a wider audience of converts and believers.
- Continuity among the change agents that achieves consistency of effort.
- Someone at or near the top of the organization willing to become a supporter or, preferably, a champion of the proposed change.
- Subjection of the proposed change to trials to identify necessary modifications and to provide convincing demonstrations to a wide audience.<sup>15</sup>

The whole process is greatly facilitated when certain conditions are present. A sense of great danger, a recent military disaster, or a lost war can create situations that enable the proponents of change to gain acceptance among the normally conservative factions of the community. Gaining acceptance of change is necessary to achieve progress but not sufficient to ensure intelligent choice among the options or smooth integration into the military system. To do so there are certain prerequisites.

There must be a stable doctrinal foundation. This is the philosophical basis for the military establishment and its approach to war. This foundation must consist of broad, general precepts. It must embody the very essence of the army's approach to war. It must be stable over extended periods of time, acting as the solid rock on which the more transitory tactics and techniques are established. It is also the basis for communicating ideas within a common context. Changes to this foundation must be few in number, implemented only with great caution and because of pressing need.

Superimposed on this foundation, there must be a doctrinal superstructure that, although it is firmly rooted in the foundation principles, is dynamic. This superstructure must be flexible, capable of change in a changing environment. While no significant change should be attempted casually, changes in this superstructure must be a normal and accepted process. This is necessary if the institution is to capitalize on new opportunities. One of the foundation principles should mandate a constant search for change opportunities and requirements. Coupled with a companion principle supporting regular, systematic innovation, this principle establishes an enduring environment that supports rational, intelligent change.

Although the concepts of stable foundation and dynamic superstructure are relatively simple to describe, they are difficult to implement. Unless the Army's leaders have a true common cultural bias and professional depth, the implementation of change can rapidly become dysfunctional. Deep understanding of the profession, its doctrine and the underlying philosophy is required to ensure that proposed innovations are sound, compatible with the main body of doctrine, and feasible. A common cultural bias provides a mutually shared view of war and the Army's principles for prosecuting it. Without such depth and common view, change can easily lead to fragmentation as opinions diverge and understandings vary. The result can be doctrinal chaos, with clear communication nearly impossible and unity of effort achieved only by coincidence. To effectively control and implement change an Army's leadership must have great professional depth and a consistent, shared understanding of doctrine and the nature of war.

Given the preconditions for intelligent choice regarding the appropriate changes, the Army must have an appropriate implementation and assimilation mechanism. Some of the features of this subset are identical to characteristics previously discussed. Others are unique to the actual assimilation process.

There must be a progressive, supportive atmosphere. A new idea is much like an infant. It needs nurturing during its early life to ensure its sustainment until it has matured sufficiently to survive by itself. This does

not imply universal open armed acceptance. A certain amount of healthy skepticism is necessary for proper implementation and robust maturation. It does, however, require a positive attitude toward innovation. There must be a fundamental recognition that change is a normal characteristic in a healthy institution. The general attitude must be that initial shortcomings and outright failures represent challenges for the entire community to overcome. They cannot become the automatic excuse for arbitrary and premature rejection.

Effective change assimilation requires a realistic and timely evaluation mechanism. A combination of field tests, analysis, and sound judgment is required to sort the good ideas from the bad, eliminate initial flaws, integrate the new into the existing framework and gain acceptance through demonstrated effectiveness. The evaluation system must achieve thorough assessment. It must provide a basis for rapid decisions consistent with the requirement for thoroughness.

Parallel to the need for effective evaluation and inextricably intertwined with it is the need for a responsive system to acquire any materiel associated with the proposed innovation, whether or not the innovation is the materiel itself. This system must ensure that the equipment actually does what it is intended to do and that the acquisition decision can be implemented expeditiously. This last requirement is critical if the innovator is to reap the benefits of surprise and battlefield use before the opponent can devise effective countermeasures. This requirement for timeliness is easy to forget when the pressures to avoid mistakes are not balanced by demands to expedite the process.

Finally, there must be a responsive system for dissemination and education. The means to communicate the new idea must be rapid and effective. Professional journals, training teams, formal schools, and educational material must all support consistent and timely assimilation.

## The Army Today

The United States Army today has many of the characteristics required for proactive management of change. We have an emergent doctrine whose foundations can be expected to endure. This doctrine provides a stable base from which to apply the flexible and dynamic tactics and techniques appropriate for changing situations. After a period of drift, the officer corps is acquiring the professional depth to understand and apply the fundamental principles. There is increasing convergence of doctrinal thought. Those few who can not or will not learn are increasingly disadvantaged in comparison with their peers. While there is less consensus regarding the vision of the future, the competing visions are characterized by common underlying principles--probably a healthier situation than if there were no divergent opinion. Now, perhaps more than at any other time in its history, the Army can choose from a wide range of technological developments.

We have an increasingly sophisticated ability for comprehensive evaluation and measured, nearly fail-safe materiel acquisition. There is a concomitant disadvantage, however. Coupled with a complex bureaucracy and a wide diffusion of responsibility, these capabilities are bought at the cost of speed. It is possible to devote so much time to our acquisition and evaluation processes that the benefits of innovation are effectively dissipated. This situation may, by itself, forestall our growing capability to employ timely innovation as an element of combat power.

## Conclusion

Opportunities for increased military effectiveness through innovation have always been available. In this age of technological and information explosion, such opportunities are more readily available than ever before. Now, more than ever, military organizations ignore such opportunities at their mortal peril, relying on their adversaries to do the same and placing themselves at the mercy of the enemy who does not.

Armies that recognize change when it is upon them and devise the ability to cope can avoid disaster. An army with the ability to proactively identify the greatest opportunities and to assimilate appropriate changes into its war making system has an advantage that may be decisive. The US Army today has potential to refine such a capability and capitalize on innovation as an element of combat power.

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