STRATEGY RESEARCH PROJECT

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PROLIFERATING DECISION MAKERS: ROOT CAUSE OF THE NEXT RMA

BY

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ABSTRACT

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TITLE: Proliferating Decision Makers: Root Cause of the Next RMA

FORMAT: Strategy Research Project

DATE: 7 April 1998 PAGES: 40 CLASSIFICATION: Unclassified

The proliferation of far more autonomous and decentralized decision makers on the future battlefield will bring about a genuine revolution in military affairs (RMA). The *levee en mass* is an example of a social rather than a technical RMA and, consequently, one of greater duration and more worthy of emulation. The author examines the diverse disciplines of history, economics, chaos and complexity theory, and the theory and nature of war for insights into the potential for a true RMA based on proliferating decision makers. The author examines comparative economic theories suggesting that proliferating decision makers is the root of the free market's success, and that the social and cultural habits that make the market work are fungible to produce a dominance over more hierarchical systems of command and control, similar to the dominance of free markets over centralized planned economies. The proliferation of more autonomous small unit decision makers should be a precept of army after next initiatives.

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PROLIFERATING DECISIOM MAKERS: ROOT CAUSE OF THE NEXT RMA

INTRODUCTION

In his recent book *Consilience*, Edward O. Wilson asserts, "The greatest enterprise of the mind has always been and will always be the attempted linkage of the sciences and the humanities."[1] Explaining the origin of the apt title of his book, Wilson defines consilience as "a jumping together" of knowledge by the linking of facts and fact-based theory across disciplines to create a common ground work of explanation. This paper addresses the possibility of a "revolution in military affairs" (RMA) from the broad perspective of interdisciplinary consilience. It is an attempt to expand the RMA debate beyond the current emphasis on new technologies and innovative concepts, and to focus on the human dimension of warfare. Although decidedly more art than science, the study and experience of war falls close to the nexus of science and humanities Wilson refers to. In accordance with the admonition of Sun Zsu to first "know yourself," we must expand the range of disciplines from which military institutions derive insight into human potential if we are to achieve the consilience of thought required to produce a genuine revolution in military affairs.

THESIS

Drawing on insights from diverse fields, this paper will develop the theory that "proliferation of battlefield decision makers" will be the proximate cause of the next RMA. This discontinuous advance in military capability will be harnessed by the nation that first reforms the institutional values and organizational structures of its military forces to unleash the full potential of human nature. The next RMA will be initially dominated by the first nation to capture the essence of the free market dynamic, i.e. the proliferation of trusted and empowered decision makers and to incorporate that dynamic into its military institutions. That nation's forces will develop an entrepreneurial battlefield ethos that values initiative and trust over order and inspection, where success is determined not by a smarter centralized coordinator or adherence to a rigid plan, but by the exercise of decentralized initiative and timely decisions to exploit fleeting opportunity.

Discerning the character of future war is more a process of intuitive appreciation than logical proof, consequently, this paper will embrace a methodology of consilience from a diverse array of disciplines to demonstrate the relative direction and potential velocity of the next RMA. It will examine the

emerging lessons of chaos and complexity theory in light of the theory and nature of war, compare economic systems to discern the effect of proliferating decision makers, interpret the historical lessons of previous RMAs, and adapt the lessons learned from contemporary military history to provide insight on the next revolution in military affairs.

HISTORICAL PRECEDENT

Current efforts to precipitate a RMA largely seek the incorporation of emerging technologies into innovative operational concepts to produce synergistic military capability. Numerous historical examples, from *blitzkrieg* and amphibious assault, to the development of carrier aviation and nuclear weapons, validate the effectiveness of the conceptual and technological method to evolve decisive force on the battlefield. Nevertheless, this approach is evolutionary, not revolutionary. While the result of this evolutionary method may be operationally or strategically decisive in the short term, the effects do not compel current or future adversaries to radically modify their social structures and political institutions in order to field competitive capability. Human ingenuity being what it is, the duration of technical or operational dominance over an adversary is limited, since the

technology or technique is quickly emulated, and often improved, once it is shared on the common laboratory of the battlefield. Yet genuine, and somewhat enduring, RMAs do occur. The French "nation in arms" that was created following the French Revolution, and exploited with remarkable success by Napoleon, is a particular example worthy of attention.

The French Revolution changed the status of the French people from royal subjects to national citizens. Although this did not alter in any way the education, intelligence, health or diet of the average citizen, it fundamentally changed the sense of responsibility, loyalty and initiative the individual exercised in defense of the state. The results of these totally intangible factors of initiative and motivation were calamitous for the kingdoms of Europe. Unable to compete with a nation that could mobilize its entire population in support of national wars, the monarchies suffered repeated defeat with traditionally recruited, trained and fielded armies. The *levee en masse* was a genuine revolution in military affairs that was achieved without any significant disparity in the technical means of war. The French Army leveraged intangible advantages, derived from the enhanced empowerment of its populace, to achieve extraordinary success in battle.

The operational dominance generated by the French RMA had an extended duration when compared to conceptual innovations such as *blitzkrieg*, or technical advances such as gas warfare and the atomic bomb. The defeated Allied armies, entrenched in military systems supported by benevolent despotism, were slow to comprehend or even acknowledge the changes. The difficulty of changing emotionally charged social and political attitudes of long duration, what contemporary thinkers might call a paradigm shift, is far more difficult and complex than adjusting to technical innovations. Consequently, developments of non-technical and non-methodological RMAs have a precedent for being rare, but more enduring. The Prussians, for example, were not about to subject to rigorous analysis the military institutions that gave such remarkable success to Frederick the Great. Victory in their last great war vindicated their contemporary methodology, and recent defeats were attributed to individual mistakes or allied disputes.[2]

Denial, however, was not a method tolerated by the German military reformers. Under the rigorous intellectual leadership of Scharnhorst, the Germans were compelled to contemplate the effect the French Revolution had on military capability. Enhancements in battlefield enthusiasm, initiative, leadership, operational mobility and flexible tactical doctrine were among

the many by-products of the French Revolution discerned by Prussian military thinkers. Since the origins of these enhanced military capabilities were to be found in social institutions, they were overlooked in the first glance of military theorists. Indeed, most Prussian officers accepted as given the existing social, political, economic and military structures of Prussian society and refused to consider non-military factors in their operational analysis.[3] Scharnhorst saw this ignorance of French national character as the major reason for the Allied defeat.[4]

> Scharnhorst knew that war could not be studied in isolation. It had to be analyzed in context. This meant that the scope of military history encompassed much more than just "military" factors. Officers had to be taught to appreciate the social, political, economic, technological, and moral forces that influence military institutions and operations. The so-called art of war embraced all of these factors. Convincing the members not to base their studies on exclusively military or tactical considerations proved to be Scharnhorst's most formidable task.[5]

Scharnhorst demonstrated that effective study of the French revolutionary success on the battlefield required a multidisciplinary approach. Similarly, our ability to precipitate or prognosticate a future RMA necessitates a consilience of multidisciplinary insights. Of course, Scharnhorst's true interest lay in the operational effects the French RMA produced on the battlefield. He required his contemporaries to observe the beneficial operational effects exhibited by the French and then study their cause. Likewise, but conversely, the architect of a future RMA must be able to

generate, or recognize, social, political and economic changes that can be leveraged to produce enhanced operational effect on the battlefield of the future.

One of the primary operational enhancements the Prussians recognized was the use of *tirailleur* or skirmisher tactics by light infantry forces. Among the members of Scharnhorst's *Militarische Gesellschaft* was Major Knesebeck, who had observed the French light infantry forces in six engagements. He noted that the French could employ "their entire infantry" as light forces "and with decided superiority." Knesebeck observed:

> It is here that the education of the individual is of such great benefit to the Republicans, because situations too often occur during the combat of light troops in which the officer's control ceases completely...in which each man acts on his own.[6]

Scharnhorst was convinced that French military superiority was the direct result of a new French social and political order and that the most significant manifestation of these changes was the greatly enhanced capability of the common French soldier and junior officer to exploit his natural intelligence and independent judgment.[7] In contrast to the Prussian fusilier, the French *tirailleur* was free to think and respond as part of a team. Scharnhorst's biographer, Charles White makes this point emphatically clear in *The Enlightened Soldier*:

> The real problem here was the social, political, and moral implications of training the third rank of the line battalion to think and fight as individuals. The advent of the skirmisher marked the beginning of a new epoch in warfare, and his spirit embodied "the civil rights of the art of war." No longer could the soldier be treated like "a mere machine." Now he would have to be acknowledged as "an important participant" in any tactical scheme. This is why the French Revolution had such a tremendous impact on the art of war. It destroyed the shackles that had enslaved the will of the common soldier, and had released a force unprecedented in the history of warfare. In Prussia, the reality of the individual soldier fighting willingly for a cause he believed in was unimaginable to most officers and civilians . . .for most Prussian officers, skirmishing was politically suspect and militarily unnecessary.[8]

Scharnhorst's reforms did not end with advocating skirmisher tactics. He was a vociferous proponent of combined arms divisions capable of independent operations. By providing subordinate commanders with all arms he advocated divisions and corps that could fight independently. In creating combined arms divisions he emulated Napoleon, but he did Napoleon one better by creating the Prussian general staff system. Scharnhorst not only advocated the proliferation of decision makers at the tactical level; he recommended expansion of the number of decision makers at the operational level as well. The staff system not only served as a decision aid team for the commander, (Napoleon, in contrast, preferred to rely on his individual genius), it also enabled multiple combined arms forces to disperse and concentrate under the direction of separate commanders in accordance with a commonly understood vision. The

reforms Scharnhorst initiated, and the staff system he helped to create, eventually brought about Napoleon's defeat at Leipzig.

Although most of Scharnhorst's reforms have been universally adopted and are commonplace in military institutions today, they generated considerable controversy in his own age.

> The idea of a soldier or officer who could think or act independently, even without orders, was simply too horrifying and altogether unprofessional to those reared in the traditions of Frederick the Great. Such notions would destroy the very fabric of the Prussian Army.[9]

But Scharnhorst persisted. Although it took years for his ideas to permeate the defeated Prussian Army, his acolytes eventually brought about the end of French imperialism. Remarkably, in order to garner the national military power of a people in arms, the German reformers prompted the liberalization of German society and politics. **In order to compete with a free people, the Prussians were forced to emulate them.**

From this quick glance at the *levee en masse* and the lessons learned by the German reformers, we can glean some insights on the characteristics of a genuine *revolution* in military affairs. First, the national character of a people and the nature of their social and political institutions will determine primarily the capability and limitations of their military forces. The French RMA was not based upon

technological innovation or advantage. There was little technological disparity between the weapons of the land power antagonists during the Napoleonic Wars. Next, significant advantage accrued to the forces that were best able to expand the number of competent decision makers and the quality and complexity of the decisions they were responsible for. Last, there is a strong tendency in highly evolved military institutions to undervalue the competence and initiative of the individual soldier.

Significant to our study, this period of military history begins a parabola of progress based on the decentralization of forces and the expansion of combat decision makers. Although rudimentary by contemporary standards, the increased reliance upon the will, fortitude and initiative of the individual soldier was truly revolutionary. Comprehending the changed social geometry, Scharnhorst positioned Prussia to be on the arc of the lofting parabola of human potential. Later German military theorists and practitioners would build on this initial success and advance higher on the parabola with infiltration tactics and *blitzkrieg*.[10] The RMA we seek today will be found still closer to the ever expanding apex of this same progressive parabola of individual initiative, decentralization of authority and proliferation of decision makers.

Napoleon inherited the changed social and political conditions necessary to revolutionize warfare and exploited them comparatively soon after they occurred. The Prussians slowly recognized that their deficiency in operational capability resulted from asymmetries in social and political factors, and sought to better compete on the battlefield by liberalizing Prussian society and its values. The possibility exists that, had the French not been so quick to capitalize on these social asymmetries for military ends, their military potential may have remained dormant and undiscovered for years. Which begs the obvious question; are there dormant and un-exploited social or political changes that have occurred since this last true RMA that can provide unrealized asymmetries for development by the contemporary military innovator?

ECONOMICS

The greatest asymmetry among modern nation states is in the realm of economics. Comparative economics starkly contrasts the great difference between those free market societies that leverage the will, creativity, initiative and ability to calculate risk by placing the authority for decision making in the hands of their people, with those centralized planned

economies that do not. The incontestable disparity of wealth produced by the free market system compared to any centralized planned competitor is ample evidence of what occurs when a people are empowered with the ability to make decisions pertaining to their fields of responsibility and interest.

The typical socialist centralized planned economy is logical, linear, hierarchical, and scientific. If human nature and activity conformed to Newtonian principles of cause and effect, socialism might have merited great accolades for bringing the complexity of economics under rational, organized and predictive control. Assuming near perfect knowledge of resources, means of production, workforce and population *via* statistics the state itself energetically collected, the equitable distribution of the fruits of national labor seemed assured.[11] The conundrum for the logical, linear thinker, who often views reality through the narrow lens of a Newtonian paradigm, is that such a rational and "scientific" process can fail so badly. The attempt to impose order on an essentially chaotic environment, to reduce to simple principles complex and highly adaptive individuals, and to substitute the control of the few for the will of the many, utterly failed in contrast to the competitor free market system. Although the centralized planned economy was an obvious failure from the start, its

originators and their successors persisted in attempting it, because it promised control of individuals, even if it could not control the economy. In the socialist state hierarchical order and control was valued over both efficiency and effectiveness.

In contrast, the free market system produces vast wealth, as individuals freely choose, create, interact and decide across a wide variety of human activities. The many individuals, each pursuing their own self interests as they interact with others within the framework of basic rule of law, should, by any linear cause and effect theory, produce massive social incoherence and chaos, since there is no central coordinating authority to synchronize the activity. Yet the very opposite occurs. Bottom up interactions between individuals generates self-organizing cooperative relationships that self optimize or mutually satisfice to promote self-interest with optimum efficiency. By accepting distributed responsibility, and ensuring commensurate decision making authority, the free market economy engages a naturally chaotic environment and responds with a flexible, adaptive economic order that generates wealth, opportunity and social coherence.

The primary difference between the free market and the central planned economy concerns who the system trusts and

empowers to make decisions. The central planned economy trusts the intellectual or experiential elite--a few very smart or experienced individuals who know what to do. The decisions are so important, and the results so critical, that the leadership cannot allow the uninitiated to dabble in the important and complex details.

The market economy, on the other hand, finds the entire system far too complex for even the most intelligent individual or group of individuals to fully comprehend in detail. Knowing that the decisions are complex and the consequences dear, the free market opts to broaden the decision base as wide as possible. By empowering a much larger number of interested, but not necessarily professional decision makers, the market economy engages chaos and develops a large number of individuals with experience in interacting with its complexity. These individuals learn from and adapt to the market environment, capture fleeting opportunities as they occur, act on their own initiative, cooperate with their neighbors to overcome common problems, take calculated risk and produce synergistic efficiencies in the quest for self interest and wealth. The collective intelligence and energy of the many is proven to be far greater than the refined knowledge of the few. Some individuals will risk and fail, but because the hierarchical

pyramid has been flattened, fewer will be effected. The example of both the failed and the successful contribute to the learning curve and adaptive response of all. Since so many are engaged, the overall "system" learns and adapts with remarkable speed. Multiple entrepreneurs, alert with initiative, are quick to discern and exploit fleeting opportunity.

Despite almost two hundred years experience with a non-linear free market economy, Americans still persist in seeking battlefield advantage by refining military institutions modeled on centralized, linear, hierarchical, Newtonian principles. As in the army of Frederick the Great, these principles have served our forces well over the years, but like Frederick's Prussian descendants, we might soon find ourselves studying how we lost our advantage. The similarities between our conventional military organization for war and a centralized planned economy are direct and obvious. Both are top down hierarchies that rely upon the centralized planning of the few to direct the energy of the many. Execution is decentralized to some extent, but initiative outside of the established plan is largely suspect. Focus is disproportionately directed on generating internal order and establishing control, rather than on engaging the enemy, generating a faster and more continuous operational tempo

and seizing fleeting opportunity. Organizational communications are constructed to pass information up and send direction down.

Conventional economics provides insight on the importance of proliferating decision makers to leverage human nature; the so called "new economics" provide examples of decentralized decision process leveraging the new communications technologies. Kevin Kelly, executive editor of Wired magazine and author of New Rules For the New Economy, combines the experience of cutting edge businesses with wisdom emerging from the biological sciences and chaos and complexity theory. He presents numerous examples of decentralized decision making profoundly improving productivity. A particularly apt example is from Mexico:

> Any process, even the bulkiest, most physical process, can be tackled by bottom-up swarm thinking. Take, for example, the delivery of wet cement in the less-than-digital economy of rural northern Mexico. Here Cemex (Cementos Mexicanos) runs a ready-mix cement business that is overwhelming its competitors and attracting worldwide interest. It used to be that getting a load of cement delivered on time to a construction site in the Guadalajara region was close to a miracle. Traffic delays, poor roads, contractors who weren't ready when they said they would be, all added up to an on-time delivery rate of less than 35%. In response, cement companies tried to enforce rigid advance reservations, which, when things went wrong (as they always did), only made matters worse ('Sorry, we can't reschedule you until next week.'). Cemex transformed the cement business by promising to deliver concrete faster than pizza.. Using extensive networking technology-GPS real-time location signals from every truck, massive telecommunications throughout the company, and full information available to drivers and dispatchers, *with the authority to act on* it-the company was able to promise that if your load was more than 10 minutes late, you got a 20% discount.
>
> Instead of rigidly trying to schedule everything ahead of time in an environment of chaos, Cemex let the drivers themselves schedule deliveries ad hoc and in real time. The drivers formed a flock of trucks crisscrossing the town. If 3 contractor called in an order for 12 yards of mix, the available truck closest to the site at that

> time would make the delivery. Dispatchers would ensure customer creditworthiness and guard against omissions, but the agents in the field had permission and the information they needed to schedule orders on the fly. Result: On-time delivery rates reached about 98%, with less wastage of hardened cement, and much happier customers.[12]

How a Mexican company decentralized decision making and solved its problems of "just in time delivery" of cement contrasts sharply with how Joint doctrine centralizes the delivery of air delivered ordnance, and speaks volumes about institutional habits and proclivities. The Cemex example provides important insights on the growing inverse relationship between control and effectiveness. Kelly does not denigrate the important role of leadership in institutions, but he makes it clear that:

> At present, there is far more to be gained by pushing the boundaries of what can be done at the bottom than by focusing on what can be done at the top...The great benefits reaped by the new economies in the coming decades will be due in large part to exploring the power of decentralized and autonomous networks.[13]

American defense institutions continue to assail the law of diminishing returns as they struggle to incrementally improve the functioning of higher level staffs. The opportunity cost of this prodigious endeavor is the lack of attention focused on improving the speed and autonomy of lower levels of command.

THEORY AND NATURE OF WAR

Our current military organization for battle fails to exploit the most obvious advantages of our national character at the operational and tactical levels of war. Military organizations expend considerable effort to promote institutional conformity that inadvertently suppress initiative by narrowly allocating decision authority along functional lines, and then establish and enforce procedures to keep everyone in their designated lane. Holistic solutions and perspectives are precluded by administrative compartmentalization. Coordination is rarely done between adjacent or supporting units without the intervention--and associated friction--of a designated coordinating authority. This can lead to economy of centralized management, but often at the expense of timely support. Bottom-up associations and solutions are stifled by top down administration.

The current system is not without its merits, and ultimately some form of linear process does help organizational functioning. Some aspects of our world, particularly the physical dimension, are fairly well represented by the linear Newtonian paradigm. However, as our glimpse of comparative economics suggests, many human interactions, such as commerce

and war, are not well replicated in the Newtonian model. The genius of Clausewitz was that he comprehended the non-linear nature of war in an age that was energetically learning and gratuitously applying the emerging theories of Newtonian physics across a wide variety of disciplines. A student of the physical sciences in his own right, Clausewitz discerned the critical incongruities between the interactions of warfare and the cause and effect relationships of the physical sciences. He strongly resisted the proclivity of his age to submit the study of war to reductionist theories. His own study and experience suggested that scientific determinism was incompatible with the unpredictable nature of war. Linearity could not account for his observation that combat power accrued synergistically from both physical and intangible forces, and moral factors were disproportionately significant when compared to the physical means. Most significantly, Clausewitz understood that war was a dynamic process between two competing wills that interacted in real time within an environment of fear, friction and uncertainty. The reactive nature of the enemy precluded predictability and certainty for Clausewitz, and caused him to eschew any attempts to reduce war to an action--reaction concept, such as a chess match. He understood that in warfare, moves are not necessarily sequential, but can become simultaneous.

Nevertheless, Clausewitz was a captive of his age and much of his writing is laced with metaphors heavily laden with terminology taken from the physical sciences. In an age enamored with science and Newton's principles, Clausewitz lacked an overarching set of scientific principles or explanations that would provide the terminology and perspective need to describe those aspects of war that remained outside of Newtonian bounds. The complimentary and emerging sciences of chaos and complexity theory provide us with the tools and terminology that to some degree quantify Clausewitz's qualitative insights.

CHAOS AND COMPLEXITY

Incorporating chaos and complexity theory into a consilience of RMA disciplines provides both an alternative conceptual paradigm and a more robust lexicon to describe the nature of war. The essential difference between the traditional, linear, Newtonian approach to organizing and conducting warfare and the non-linear approach suggested by chaos and complexity theory—and presciently hinted by Clausewitz--is the contrasting ways they deal with the chaos and uncertainty of war.

The linear approach seeks to *impose order* on a chaotic environment by generating reductionist control mechanisms that attempt to simplify complexity by breaking problems into component parts. A great deal of attention is focused internally on the generation of organizational doctrine, control measures, coordination techniques and procedures. Non-linearity accepts chaos as inherent to warfare and seeks to better adapt to the environment than the adversary. The enemy is understood not only to be "reactive" as Clausewitz noted, but potentially interactive. The relative decision-action speed of adversaries engaged in conflict determines the ability to generate operational tempo and gain the initiative, i.e. reduce the enemy decision cycle to reaction mode. To achieve this decision cycle dominance, chaos and complexity theorists advocate a proliferation of "complex adaptive systems" generating numerous decisions that can be deliberately "out of phase" with each other to provide constant stimulus to fatigue the centralized enemy decision process. **Speed of adaptation** will form another cycle similar to the traditional observation, orientation, decision, action loop (OODA loop). Focus is on the adversary, discerning his intentions and interacting advantageously.

Non-linear approaches willingly enhance chaos and uncertainty if advantage can be gained relative to the adversary

by faster decision and adaptation cycles. Complex, yet futile, organizational attempts to control chaos are eschewed in favor of developing resilient organizational structures that are highly adaptive to changing combat circumstances and enemy innovation. Similarly, the enemy is considered as a dynamic, adaptive and resourceful opponent, who is himself capable of being a significant generator of surprise and chaos.

Both linear and non-linear models can be useful in describing, interpreting and conceptualizing the nature of war and its contemporary character. Arguably, in the day of massed, on-line formations, the linear model was not only suitable, but optimized. However, the growing complexity of war, and growing knowledge of the counterintuitive truths of the new sciences will shift the paradigm by which we will understand how the world works. More to the point, we will come to better understand how complex adaptive systems, like mankind, work in a world that still responds to the linear principles of Newtonian physics. Unfortunately, the non-linear principles of chaos and complexity have begun to be viewed as a competing paradigm with linearity. This perception of competition will transition to an understanding of how both linear and non-linear models are compatible, and not mutually exclusive ideas. Eventually both perspectives will become complementary concepts that will enable

he who can master and aptly employ both to produce synergistic wisdom, wealth, and national power.

The chaos and complexity model will become the dominant template for future military organization and innovation. Warfare will not be the first discipline to incorporate the principles of these emerging theories; war will follow science, economics and business, where the counterintuitive truths of chaos and complexity theory are already having dramatic effect. Several factors will drive this paradigm of innovation.

First, warfare will grow in complexity. Warfare has always been a highly complex undertaking, but in wars past linear models were adequate to approximate the comparatively limited number of battlefield variables. During our own Civil War, for example, the adversaries were technologically mirrored, and attempts to gain technological advantage were often immediately thwarted, as occurred with the simultaneous fielding of the evenly matched Monitor and Virginia ironclads. With the opposing forces using identical weapons and tactics, the terrain became the primary battlefield variable. Extensive effort went into understanding the nature of the terrain, with advantage often going to the commander who used it best. Today, the variables include a wide range of technological innovations that

are employed not only on land and sea, but in the air and space as well. These many tangible variables, aside from those introduced by human fog and friction, are sure to produce myriad asymmetries on the future battlefield.

Second, adaptive preparation for future war will also marginalize the utility of the centralized linear model of organizing armies and procuring equipment. The plethora of new technological innovations and "systems of systems" will open an indefinite number of technological variables for the force developer to choose from. Process intense procedures for discerning requirements relative to rapidly mutating enemy system capabilities will be far too slow to adapt to dynamic battlefield conditions. The time lag resulting from procedural inertia will be further compounded by the need to select from a wider array of technological options. Even advocates of linear models attempting to surmount this problem acknowledge that the non-linear introduction of emerging technologies will challenge formal tools like Assumption Based Planning (ABP) and that "Genuine intuition and experience judgment may prove just as valuable as formal decision making tools, perhaps even more so."[14] Connecting the decision making process for equipment selection and development down to the unit level will field a wider variety of systems for experimentation in the crucible of

battle. With experience gained from battlefield interaction, sufficing systems can be introduced until more optimized systems evolve. The innovation, experimentation, feedback process will be continuous throughout the war. This proliferation of innovators would be the biological equivalent of expanding the gene pool. Current procedures are "inbred" with commensurate results.

Third, the character of warfare will continue to grow less predictable, and the requirements to meet its rapidly mutating challenges will emerge directly from the battlefield. The relative advantages and disadvantages of new weapons and technologies will be largely undetermined until they interact on the field of battle with the new and innovative enemy systems and concepts that oppose them. The imponderable number of quantitative and qualitative beginning variables that precedes interaction with the enemy further complicates the already unmanageable problem of battlefield predictability that linear planning formulas are designed to produce. Linear techniques are designed to identify tangible and quantifiable requirements that can be used to assure predictable success. Statistical information on our own organization is rigorously pursued to meet planning and development schedules. Eventually, a centralized process provides standardized equipment common to

all. While some degree of centralized standardization is necessary for communications and interoperability, standardization can inhibit rapid technological adaptation. Save for what soldiers have on hand from foraging, captured enemy supplies and their own expedients, neither the materials nor time are usually present on the battlefield to allow adaptation to take place forward. Nor, traditionally, are the contractors who habitually produce the weapons employed. The battlefield innovation of the "Rhino Tank" to bust the hedgerows in Normandy was a significant bottom-up technological innovation led by NCOs. Similarly, "the Petersburg crater" produced by the Union miners from Pennsylvania capitalized on unit unique "nitch knowledge" to potential advantage. These events are atypical examples of bottom up initiative that sporadically punctuate the history of linear warfare. The limited examples of such initiatives demonstrates how successfully linear military organizations can suppress the inherently innovative capability of otherwise "highly complex adaptive systems." If we choose to build on the non-linear model we will capitalize on the innovative potential that is latent in our soldiers and make it commonplace on the future battlefield.

COMMAND AND CONTROL

Chaos and complexity theories are relevant to our inquiry into a potential revolution in military affairs not only because these theories provide us with an enhanced model to understand the dynamic nature of war, but because they also suggest more optimized models of command, based on realistic appraisals of human cognition and decision making potential.

In his anthology of "Speculations on Nonlinearity in Military Affairs," entitled Coping with the Bounds, Thomas J. Czerwinski credits Martin Van Creveld for discerning three dominant methods of command and control—*direction, plan and influence*. He notes that command systems are designed to address the "pervasive underlying commander's quandary—uncertainty and insufficient information," and asserts that a variant of each of the three methods of command can be found as dominant in a contemporary US service's future force initiative.

> The system supporting command by direction is the Army's "Force XXI" and its digitized battlefield. The "System of Systems" advocated by the immediate past Vice Chairman of the Joint Staff is a command-by-plan approach. Finally, command by-influence is associated with maneuver warfare to which the Marine Corps is doctrinally committed.[15]

Command by direction is the oldest method of command and control and extends from the beginning of primitive formation battles until the mid 1800's. It was the preferred method of kings and generals who could have line of sight observation and control over most of their force on the battlefield. The problem of uncertainty was resolved for the king by keeping the forces tight and within visual signaling distance. The digitized force seeks to replicate this level of visual simplicity for the commander with thick band width and display screen icons.

The advent of modern weapons required dispersion well beyond visual range, so *Command by Plan* was developed by Frederick the Great. This methodology opts for "comprehensiveness over dynamism" and "inherently fights the disorderly nature of war as much as the adversary. It is a futile quest to will order upon chaos." Czerwinski characterizes the command by plan method as "trading flexibility for focus," and notes that it has become the highly centralized command method of choice for most modern forces. Today's variant of command by plan envisions a "system of systems" that provide "dominant battlespace awareness" to conduct "precision warfare." It drastically reduces information requirements by avoiding interaction with the adversary and simplistically

focuses on compiling and prioritizing target lists to destroy a limited set of key targets related to centers of gravity. To the greatest extent possible, the contemporary version of this system reduces the enemy to an inanimate set of targets. A finite number of enemy reactions are "planned for" as branches and sequels to a main plan, but for the most part, a truly interactive enemy is to be avoided *via* centrally controlled standoff technologies.

Command by Influence is designed to distribute uncertainty in a manner highly analogous to the free market economy. What the commander wishes to influence is articulated *via* mission type orders that effectively convey a general concept of operations and commanders intent. Influence replicates the function of Adam Smith's "invisible hand" as the uniting force behind a proliferation of decision makers. Command by influence interacts with, rather than avoids or simplistically reduces complex situations.

> . . . only the outline and minimum goals of an effort are established in advance, effectively influencing all of the forces all of the time. Unlike other command forms, this method takes disorder in stride as "inevitable and even insofar as it affected the enemy as well, desirable." Great reliance is placed on the initiative of subordinates based on local situational awareness, which translates to lowered decision thresholds. It relies on self-contained, joint, or

> combined arms units capable of semi-autonomous action. All of this activity occurs within the bounds established by the concept of operations derived from the commander's intent.[16]

Command by influence is the appropriate adaptation to the non-linear, post-Newtonian realities of modern warfare. It is optimized for an environment of uncertainty, complexity and unpredictability, where experienced intuition and pattern recognition are prized over transient knowledge, and self organization at the "edge of chaos" is favored over slower, static, hierarchical, centralized systems. The ability of decentralized and "decision empowered" units to rapidly and advantageously interact with more intimate situational awareness is a tremendous advantage over centralized systems which, however well connected by electrons, respond slower. Modern communications technologies are useful to leverage the capabilities of command by influence, but not integral to it. Other technologies, such as "missiles in a box," which hold promise of providing small units integral ordnance for fires against armored, air and personnel targets, will enhance self reliance, reduce logistics and enable greater autonomy on the battlefield. (As did Stinger missiles in the hands of Afghan and Contra rebels.) Since Americans are habituated to decentralized decision making by virtue of our economic system, we have a strong cultural advantage over many potential

centralized, despotic adversaries; a situation analogous to the advantage enjoyed by post-revolutionary France over the monarchies of Europe.

Properly, and of necessity, a nation's military institutions are a sub-culture of the dominant culture they are sworn to protect. Unless the nation is a militarist state, this sub-culture status is designed to provide opportunity for the military to promote those unique personal virtues and institutional qualities that are required during war, but otherwise divergent from more liberal social values. However, to the degree that the two cultures can share a common set of basic assumptions on how to maximize human potential, we can more readily leverage our national character to military advantage. Currently, the military sub-culture, intent on conformity and order, drills out many of the very qualities our wider culture intrinsically values and inculcates into its citizenry to achieve wealth. Yet there are strong indicators, from diverse sources, that these are the very qualities we will want to proliferate in the "army after next."

The essence of command by influence is the interaction of a clearly articulated commander's intent with highly autonomous, self directing, decision makers. Focus is not on internal

control, but on external result. Uncertainty is dealt with by intuitive comprehension based on pattern recognition and localized situational awareness, not by ever expanding and time consuming quests for information. Timely "satisficing" interactions are preferred over more optimized, but delayed "solutions." The organizational values of such a force are trust, initiative, intuition, risk and adaptability. Some internal disorder is tolerated, even protected, as a necessary trade-off for enhanced velocity in the OODA loop and adaptation cycles. Higher operational tempo to gain and maintain the initiative is valued over slower more comprehensive efforts. Multiple OODA loops acting in concert, but not in phase, compound the confusion of the enemy and render his ability to discern operational patterns difficult.

CONCILIANCE

The intersection of chaos and complexity theory, military history, contemporary conflict, theory and nature of war, and economics all point to a future where the dominant force on the battlefield will be the one that can best proliferate competent, more autonomous decision makers, who freely interact with themselves and the enemy to exploit opportunity, within the bounds established by commanders intent. These units will be

led by trusted, intuitive thinkers and risk takers, who adapt quickly and innovatively to the rapidly mutating conditions of modern war. Of course, this consilience derived hypothesis is itself an intuitive leap, based on broad pattern recognition, to grasp the character of future war. Our contemporary linear models and Newtonian thought patterns are self-perpetuating, and will not transition logically to this same recognition. Consequently, we will not construct the "army after next" until we have first encountered the enemy after next.

The popular Prayer of St. Francis asks for the strength to change what may be changed, the perseverance to deal with what cannot change, and the wisdom to know the difference. Clausewitz and Sun Tsu capture and articulate the essential and unchangeable nature of war. Specious arguments that new technologies and systems will redefine war, or make high-minded promises of a more humane form of warfare are beyond the pale of credibility. The character of war is mutable, but its fundamental nature is as fixed as the nature of the men who wage it. Similarly, the real world represents a continuum of activity from the static to the dynamic and beyond to the chaotic. Chaos and complexity theory leads us to understand that as we move closer toward the chaotic—without falling in--we maximize the dynamic properties of human nature. Still there

will be many linear processes that will remain part of the process of war. The successful force of the future will be that which can move seamlessly between both linear and non-linear concepts and aptly apply each in the manner most effective. Wisdom lies with the force that can make these distinctions.

Ever more important in future war will be those intangible factors that elevate the warrior to the status of soldier. The proliferation of authority and responsibility downward to small unit leaders will make strong demands on character and leadership. The lack of "elbow touching" that has traditionally provided solidarity on the battlefield must be accounted for by greater effort in training to develop cohesion. The moral and organizational values of the force will remain of primary importance, but they will be different, or at least different in emphasis. Responsibility will be more important than accountability, initiative more important than conformity, expectation more important than inspection, and innovation more important than procedure. Above all, trust will be the paramount institutional value. Trust will be complimented by the command quality of nerve. The battlefield challenge of the future large unit commander will be the exercise of self restraint. Once he has clearly articulated his intent and concept of operations, he will need nerve to allow independent

subordinates to maximize opportunity. The commander will be the custodian of the vision, verbalized as intent, and constantly promulgated and updated by every communications means available.

Recent history demonstrates how our adversaries have leveraged our propensity for centralized, risk adverse, hierarchical command organization to defeat our capabilities. From dead Rangers in Somalia to wasteful and counterproductive bombing efforts in Yugoslavia, current history is rife with examples of how the linear paradigm of warfare is crumbling. Still, rigidly linear concepts, like those of Douhet, linger on and serve to mark how impervious our thought process really is. The Afghan rebels, armed with Stinger missiles, prototyped how autonomous, nearly undetectable small units can vex a large centralized force. Regretfully, America's adversaries are adapting to counter traditional methods of national power projection faster than we are innovating them. Yet we persist in seeking greater technical rather than organizational innovation, and develop ever more expensive and centralized systems of systems. Mechanized decision aides are sought to better empower the same slender number of decision makers, rather than to distribute the decision process among those most involved.

In many ways, we find our plight similar to the French army between WWI and WWII. Eugenia C. Kiesling, in her book Arming Against Hitler: France and the Limits of Military Planning, provides a historic parallel that helps explain our situation. The French generals, she concludes, did their best within the social values, military traditions and resources allotted. They were confined by the bounds of the social system they supported and their own institutional values. The French army did what was feasible and produced a valid plan. However, it was designed to meet internal constraints and failed to adequately consider external enemy capabilities. The domestic feasibility of the plan did not insure its relative effectiveness. The French had won the last war, so the previous formula was considered validated. Similarly, IBM's dominance and competence in the mainframe computer industry caused them to scoff at the introduction of the personal computer until the competition nearly drove them out of the market, just as our evolved, complex, hierarchical military structure will cause us to neglect the empowerment of the small unit decision maker until we meet him as an enemy on the battlefield. Like Scharnhorst and the German military reformers, we will be responding to the initiatives taken by innovative adversaries and attempting to educate ourselves to their methods. In short, we will fail to

learn one of the most important lessons of the "new economics"—readiness to abandon success, before current methods are surpassed by more innovative competitors.

The consilience approach leads us to a better understanding of future war and its character, but the same approach focused on established, successful, hierarchical institutions reveals that it is highly unlikely that they will have the foresight, incentive, or perspective to effectively innovate to the extent required to capitalize early on the next RMA. This is an objective appraisal, not an excuse for failure to meet the responsibilities of leadership. Once again Scharnhorst can be invoked as a role model for the contemporary military reformer. His ability to influence the self-education process of the German officer corps was critical to the ultimate success of the Prussian army and the victory of the Allies over Napolean. We must find our Scharnhorsts and place them in positions from which they can prepare the minds of future leaders to first accept and then cultivate the values that will enable a proliferation of combat decision makers.

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ENDNOTES

[1] Edward O. Wilson, Consilience: The Unity of Knowledge (New York: Alfred A Knopf, 1998), 8.

[2] Charles Edward White, The Enlightened Soldier: Scharnhorst and the *Militarische* Gesellschaft in Berlin, 1801-1805 (Westport, Connecticut: Praeger, 1989), 57.

[3] Ibid.

[4] Ibid., 61.

[5] Ibid., 57.

[6] Ibid., 59.

[7] Ibid., 62.

[8] Ibid., 77-78.

[9] Ibid., 60.

[10] Timothy T. Lupfer, "The Dynamics of Doctrine: The Changes in German Tactical Doctrine During the First World War," Leavenworth Papers (July 1981): 28.

[11] Ludwig Von Mises, Human Action: A Treatise on Economics (Chicago, Henry Regnery, 1963), 676-682.

[12] Kevin Kelly, New Rules For the New Economy: 10 Radical Strategies for a Connected World (New York, Viking Penguin, 1998), 14-15.

[13] Ibid., 18-19.

[14] Antulio J. Echevarria II, "Tomorrow's Army: The Challenge of Nonlinear Change," Parameters (Autumn 1998): 95.

[15] Thomas J. Czerwinski, Coping With the Bounds: Speculations on Nonlinerity in Military Affairs (Washington, D.C: National Defense University, 1998), 234.

[16] Ibid., 240.

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