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## Leveraging Science in the Manoeuvrist Approach to Counterinsurgency Operations

Ernest Y. Wong

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**The Institute of Land Warfare**  
ASSOCIATION OF THE UNITED STATES ARMY

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### **LAND WARFARE PAPER NO. 80, October 2010** **Leveraging Science in the Manoeuvrist Approach** **to Counterinsurgency Operations**

by Ernest Y. Wong

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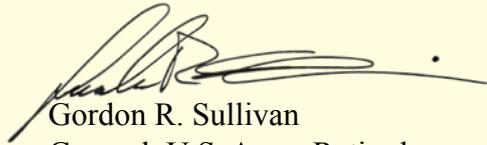
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## Foreword

Throughout history, military theorists have attempted to determine the most effective way to defeat an adversary. British military doctrine defines this method as the Manoeuvrist Approach, which focuses on shattering an enemy's will to fight through his center of gravity. In the counterinsurgency (COIN) fight, however, it is the insurgents who appear to have become more Manoeuvrist in their strategy and operations, making it increasingly difficult for the counterinsurgent to defeat them.

This paper examines how military planners can utilize modern scientific principles to improve understanding of insurgencies and leverage what is learned into even better COIN doctrine. In particular, the author addresses what we can discern from Disruptive Change, Complexity Theory and Markov Chains to help in formulating winning COIN strategies that will prevail in the 21st century.



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October 2010



# Leveraging Science in the Manoeuvrist Approach to Counterinsurgency Operations

## Introduction

According to British military doctrine, the Manoeuvrist Approach is considered the most effective way to defeat an opponent. Rather than focusing exclusively on the destruction of an adversary's capability through attrition warfare, this approach resolves to shatter the enemy's morale and will to fight through ingenuity and skillfulness.<sup>1</sup> It concentrates one's own strengths against an opponent's identified vulnerabilities and applies all conceivable ways to overwhelm his capacity to make timely and well-informed decisions. The Manoeuvrist Approach does not just target the physical component of an adversary's fighting power, it also applies direct and indirect methods to undermine the conceptual and moral components of that power.<sup>2</sup> By doing so, the Manoeuvrist is able to gain momentum, tempo and agility which, in turn, enable him not only to achieve operational initiative on the battlefield but also to progress toward a strategically decisive victory.

Much of the credit for advancing the Manoeuvrist Approach is attributed to American fighter pilot John Boyd, who studied the German army's successful *Blitzkrieg* strategy during World War II.<sup>3</sup> In particular, he researched Germany's rapid victories against France, and he gained an appreciation for how the Germans had planned their operations around a center of gravity through which they concentrated maximum effort. To better understand these military concepts, Boyd traced the German strategy back to Chinese military theorist Sun Tzu, who believed successful militaries identify and target their enemy's critical weaknesses in order to gain decisive victory. As Sun Tzu shrewdly wrote,

Nothing is more difficult than the art of maneuver. What is difficult about maneuver is to make the devious route the most direct and to turn misfortune into advantage. Thus, march by an indirect route and divert the enemy by enticing him with bait. So doing, you may set out after he does and arrive before him. One able to do this understands the strategy of the direct and the indirect.<sup>4</sup>

Hence, the Manoeuvrist Approach derives from Eastern principles codified around the third century B.C., which emphasized simplicity, contemplation and naturalness.

Unfortunately, the current conflicts in Iraq and Afghanistan suggest that it is the insurgents who have adopted a Manoeuvrist Approach. Employing a number of high-profile suicide attacks, it is the insurgents who have become proficient at shaping the operational environment by creating the perception that they are fully committed to achieving their end-state of imposing their own form of rule. With a keen comprehension of their asymmetric advantages, it is the insurgents who have aggressively attacked their adversary's cohesion by executing their operations with greater initiative and surprise. Single-minded in their resolve to expel unwelcome foreign interference, it is the insurgents who have shown resolve in protecting the cohesion of their own forces while exposing the vulnerabilities in their enemy's tenuous political and military coalitions. Taking maximal advantage of propaganda and the media, it is the insurgents who have advantageously exploited the situation by communicating both their own successes and the mistakes of their enemy. Historian Samuel Griffith sums up the advantage insurgents have in the following way:

Because of superior information, guerrillas always engage under conditions of their own choosing; because of superior knowledge of the terrain, they are able to use it to their advantage and the enemy's discomfiture.<sup>5</sup>

Thus, the task of defeating the insurgencies in Iraq and Afghanistan has become an increasingly difficult undertaking.

An even bleaker picture for carrying out a successful counterinsurgency (COIN) campaign emerges when reflecting on prominent historical examples where insurgents prevailed using a Manoeuvrist Approach. During the Wars of Scottish Independence from 1296 to 1357, Scotland successfully forced the English invaders out mostly by avoiding large battles, isolating British outposts and initiating a scorched-earth policy. In the American Revolutionary War from 1775 to 1783, the outnumbered and ill-equipped American irregulars repelled the British Regulars with constant skirmishes and hit-and-run tactics from behind trees and bushes. During the Iberian Peninsular War from 1807 to 1814, Spanish guerrilla fighters were able to sap the strength and morale of Napoleon's superior Grand Army using raids, ambushes and sabotage.

From 1916 to 1918, T. E. Lawrence helped defeat a numerically superior Ottoman Army during the Arab Revolt through highly effective mobile raids focused on the Turks' vulnerable rail lines and supply nodes. The Chinese Communist War of Liberation from 1935 to 1949 gave rise to Mao Tse-Tung and the strategy of the people's war, allowing the communist People's Liberation Army to gradually wrestle away public support from the corrupt Nationalists, who initially had overwhelming advantages in manpower, weapons and international support. During the Vietnam War from 1959 to 1975, the tenacious Viet Cong communists became particularly effective at using a strategy known as armed propaganda that resulted in the assassinations of so many local officials that the South Vietnamese government ceased to function throughout

the overwhelming majority of its rural areas. It should come as no surprise, therefore, that a growing number of those disheartened by the protracted struggles in Iraq and Afghanistan regard COIN operations to be unwinnable.

Despite these difficulties, many nations engaged in counterinsurgencies are adapting their military plans and updating their military doctrine to better comprehend, analyze and resolve the challenges posed by such cunning, adaptable and determined adversaries. This paper attempts to contribute to these efforts by examining how military planners can utilize modern science not only to better understand insurgencies but, more important, to leverage what is known about improving COIN doctrine. In particular, this paper delves into the topics of Disruptive Change, Complexity Theory and Markov Chains so that nations might be able to use them to help formulate winning COIN strategies. Just as John Boyd advanced military thinking in the aftermath of World War II through his research of history and statistical analysis of first-hand wartime accounts, this paper affirms that it is indeed possible to apply science to show that the Manoeuvrist Approach can prevail against insurgencies.

### **Insurgencies in the Disruptive Change Framework**

In the mid-1990s, Joseph Bower and Clayton Christensen introduced the framework of Disruptive Change in the social sciences domain to help explain one of the most consistent patterns in businesses—“the failure of leading companies to stay at the top of their industries when technologies and markets change.”<sup>6</sup> According to Bower and Christensen:

The research shows that most well-managed, established companies are consistently ahead of their industries in developing and commercializing new technologies—from incremental improvements to radically new approaches—as long as those technologies address the next-generation performance needs of their customers. However, these same companies are rarely in the forefront of commercializing new technologies that don't initially meet the needs of mainstream customers and appeal only to small or emerging markets. . . .

The technological changes that damage established companies are usually not radically new or difficult from a *technological* point of view. They do, however, have two important characteristics: First, they typically present a different package of performance attributes—ones that, at least at the outset, are not valued by existing customers. Second, the performance attributes that existing customers do value improve at such a rapid rate that the new technology can later invade those established markets. Only at this point will mainstream customers want the technology. Unfortunately for the established suppliers, by then it is often too late: the pioneers of the new technology dominate the market. . . .

*Disruptive* technologies introduce a very different package of attributes from the one mainstream customers historically value, and they often perform far worse along one or two dimensions that are particularly important to those customers.<sup>7</sup>

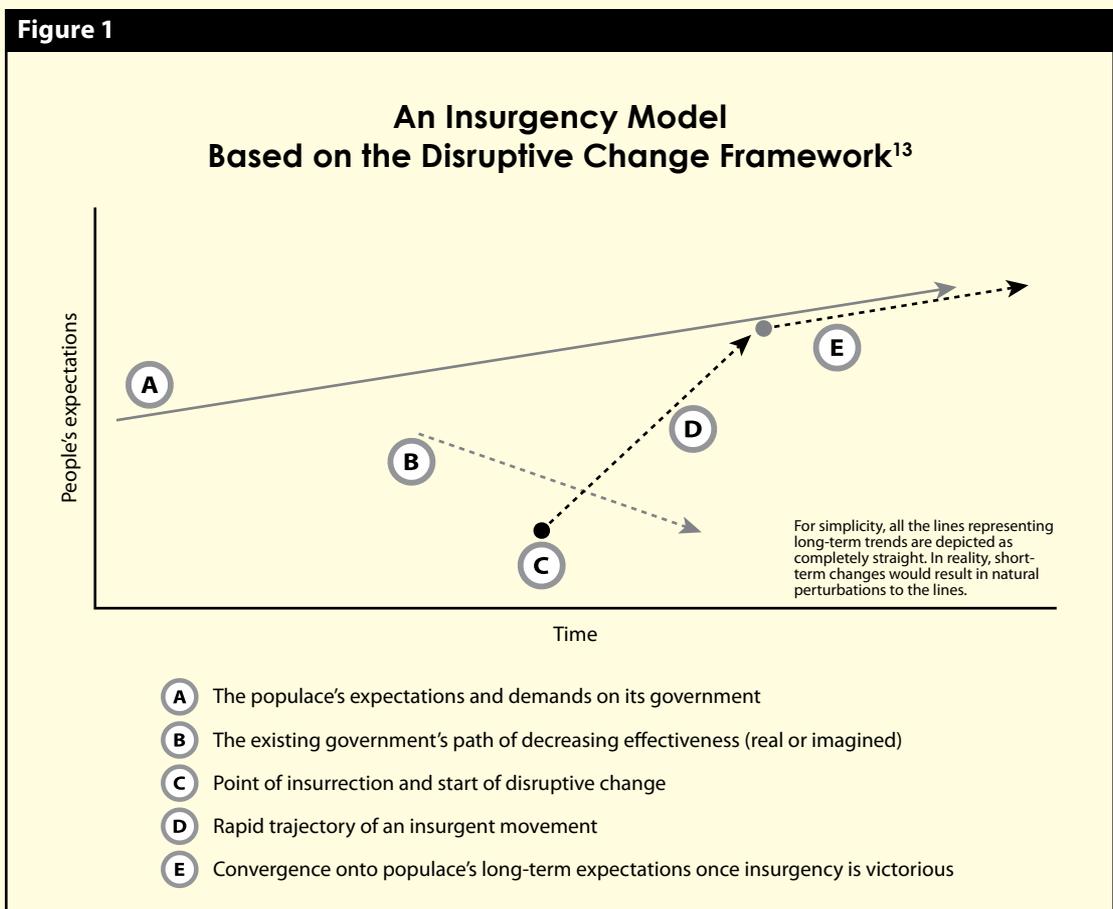
Prominent examples of leading companies that had fallen victim to Disruptive Change include Xerox, which let Canon enter the copier market with their smaller yet slower tabletop copiers; IBM, which had dominated the mainframe computer sector but was late to enter the simpler desktop computer market; and Bucyrus-Erie, whose big-bucket steam- and diesel-powered cable shovels eventually gave way to the initially smaller and weaker hydraulic excavators from Caterpillar and John Deere.<sup>8</sup>

According to U.S. military COIN doctrine, “Each insurgency is unique, although there are often similarities among them. In all cases, insurgents aim to force political change; any military action is secondary and subordinate, a means to an end.”<sup>9</sup> To overcome the inherent disadvantages of subverting an existing government’s power, “Effective insurgents rapidly adapt to changing circumstances. They cleverly use the tools of the global information revolution to magnify the effects of their actions. They often carry out barbaric acts and do not observe accepted norms of behavior.”<sup>10</sup> Successful insurgent movements, therefore, closely resemble the characteristics of successful Disruptive Change organizations that must compete with their larger, more established and better resourced leading companies. U.S. COIN doctrine further affirms this idea:

Insurgents are by nature an asymmetric threat. They do not use terrorist and guerrilla tactics because they are cowards afraid of a “fair fight”; insurgents use these tactics because they are the best means available to achieve the insurgency’s goals. Terrorist and guerrilla attacks are usually planned to achieve the greatest political and informational impact with the lowest amount of risk to insurgents. . . . Insurgents rarely use conventional tactics. Conventional operations are not always necessary for an insurgency’s success. However, insurgents may engage in conventional operations after the insurgency develops extensive popular support and sustainment capabilities.<sup>11</sup>

However, the primary reason insurgencies are akin to Disruptive Change is that as a nearly universal rule, insurgents do not have the capacity to immediately deliver on their promises of better governance—they simply do not have the resources that are available to the existing government. What they do possess is an attractive and persuasive cause that Mao Tse-Tung believed would arouse public support to their movement, which, in turn, would provide them with the freedom of action to strike throughout their enemy’s depth: “We must unite the strength of the army with that of the people; we must strike the weak spots in the enemy’s flanks, in his front, in his rear. We must make war everywhere and cause dispersal of his forces and dissipation of his strength.”<sup>12</sup> In so doing, the insurgent is able to challenge his enemy in a disruptive manner.

A simple graph plotting popular or market expectations on the vertical axis and time on the horizontal axis can help to better reveal the linkage between Disruptive Change and insurgent movements (see figure 1). Just as sustaining technologies tend to gradually improve over time, a people’s expectations of its government tend to increase incrementally with time. And just as sustaining technologies often overlook the needs of a new and emergent market, governments are often unable or unwilling to meet the demands of their citizens—usually because of a combination of indifference, corruption, lack of order, abuse and disparities in access to resources. Such deterioration in government services can be *real* because of events or conditions that make it difficult for the government to meet its obligations to its people or *imagined* due largely to propaganda and misinformation spread by the insurgents. It is also important to note that the point of inception for the government’s path of deteriorating effectiveness can begin anywhere on the graph: below the people’s expectation line if, for instance, there is a sudden shock to the system such as a catastrophic event that cripples government services; on the line if, for instance, changes in government policy no longer align with the expectations of the populace; and even above the



line if, for instance, there is a radical change in government policy that surprisingly provides for considerably more than what is demanded—unfortunately, the people believe such excesses will strain the nation into insolvency. But regardless of where this inflection point occurs, the disruptive change in governance advocated by an insurgency attempts to attract popular support.

With regard to when an insurgency begins, Griffith writes:

A potential revolutionary situation exists in any country where the government consistently fails in its obligations to ensure at least a minimally decent standard of life for the great majority of its citizens.<sup>14</sup>

Thus, once a segment of the population or market believes it can initiate a resolution that satisfies those unfulfilled needs, the time is ripe for insurrection or the start of disruptive change. And similar to how companies that focus on sustaining technologies typically fail to see how quickly the marketplace changes with the advent of a disruptive change technology, governments are often caught off guard by the spread of a tenable insurgency:

One common feature of insurgencies is that the government that is being targeted generally takes awhile to recognize that an insurgency is occurring. Insurgents take advantage of that time to build strength and gather support. Thus, counterinsurgents often have to “come from behind” when fighting an insurgency.<sup>15</sup>

And just as successful disruptive change technologies are able to meet the needs of the marketplace at an extremely fast pace, once a rebellion gains traction and becomes a revolutionary movement it usually has a rapidly increasing following that accompanies its appealing promises for a quick resolution to the nation’s problems.

Bower and Christensen acknowledge that while successful disruptive changes can theoretically progress beyond that of the market’s demand because of their steep trajectories, most actually never exceed popular expectations:

Many of the disruptive technologies we studied *never* surpassed the capability of the old technology. It is the trajectory of the disruptive technology compared with that of the *market* that is significant. For example, the reason the mainframe-computer market is shrinking is not that personal computers outperform mainframes but because personal computers networked with a file server meet the computing and data-storage needs of many organizations effectively. Mainframe-computer makers are reeling not because the performance of personal-computing *technology* surpassed the performance of mainframe technology but because it intersected with the performance demanded by the established *market*.<sup>16</sup>

Similarly, once insurgencies have successfully gained their political objectives and are in control of their nation, there is little need for continued armed conflict. Consequently, the insurgent movement ends when its goals match and satisfy the people's expectations.

The Disruptive Change framework, therefore, not only provides an extremely useful way to model insurgencies, it also presents a very straight-forward way of describing the life cycle of an insurgency. Military theorists can also gain insights for how to combat insurgencies successfully by examining Bower and Christensen's recommendations for favorably confronting Disruptive Change:

The key to prospering at points of disruptive change is not simply to take more risks, invest for the long term, or fight bureaucracy. The key is to manage strategically important disruptive technologies in an organizational context where small orders create energy [and] where fast low-cost forays into ill-defined markets are possible.<sup>17</sup>

From a military perspective this suggests that to deal effectively with an adaptable insurgency, a successful strategy requires quick, low-cost probes that provide reliable information on the insurgents and the populace. With regard to such experiments, researchers Shona Brown and Kathleen Eisenhardt provide the following insights:

If [organizations] focus their attention too much on the present, they end up chaotically reacting to the moves that others make. If their focus is too much on the future, then they tend to lock into a particular future, lose flexibility and end up in the rigidity of a planned future. In contrast, experimentation relies on small, fast and cheap probes to create a more complex and dynamic strategy for the future than either planning or reacting provides. Experimentation attempts to gain insight into the future that may unfold without losing flexibility to react to the future that does unfold.<sup>18</sup>

Thus, a successful COIN campaign requires a rapid and accurate assessment of the threat, the people and the environment so that appropriately measured actions can be taken to put pressure on the insurgents, expand the government's legitimacy and bring about a lasting peace.

Finally, it is important to note that counterinsurgencies have the highest probability of success in the early stages of the game—when they act quickly to gain a cogent understanding of the situation, respond forcefully to quell uprisings before they turn into an intractable political movement and address the key concerns of the populace with utmost urgency. Unfortunately, government responses that are late to counter an insurgency typically give rise to a threat that begins as a localized insurrection but transforms into an irrepressible popular movement. Once this occurs, the Disruptive Change framework foretells ominous consequences for COIN operations. Fortunately,

Complexity Theory can provide some insights for how to best deal with a full-blown insurgent movement.

### **Using Complexity Theory to Bolster Counterinsurgency Strategy**

Originating from the natural science and computer science domains, Complexity Theory has emerged as an interdisciplinary study that helps to explain how complex behavior arises in systems that are able to learn and adapt.<sup>19</sup> The traditional view on how living things grow, adapt and change is described by Evolutionary Theory, and it applies Charles Darwin's natural-selection principles to describe the process of gradual change across time through variation, combination and retention. Complexity Theory, on the other hand, hypothesizes that instead of waiting for favorable genetic modifications to take place over successive generations, superior trait developments can occur quickly in groups able to adapt to their complex environment. As Brown and Eisenhardt explain:

According to Complexity Theory, adaptation is most effective in systems that are only partially connected. The argument is that too much structure creates gridlock, while too little structure creates chaos. A good example would be in the traffic lights in a city. If there are no lights, traffic is chaotic. If there are too many lights, traffic stops. A moderate number of lights creates structure, but still allows drivers to adapt their routes in surprising ways in response to changing traffic conditions. Consequently, the key to effective change is to stay poised on this edge of chaos.<sup>20</sup>

Thus, while Evolutionary Theory describes a more gradual adjustment that occurs slowly over time, Complexity Theory proposes that in rapidly changing conditions, sudden variations can occur in systems that proactively adapt to their uncertain circumstances while posed on the edge of chaos.

A successful insurgency exhibits many of the same attributes that are used to describe a complex adaptive system. Just as the immune system is able to offer protection against a wide range of germs and diseases that continually attack the body, resourceful insurgents systematically alter their tactics to gain advantage on the various threats to their cause. And just as the brain is able to alter the strength of its neural connections in response to learned experiences to help ensure survival, cunning insurgents rely on asymmetric means and popular support to negate their enemy's superiority in resources and technologies. As U.S. military officer John Nagl points out,

[Insurgent] doctrine is largely one of necessity: it is essential that [its] army, without an established government to provide logistical support, retain the goodwill of the people in order to ensure its own survival.<sup>21</sup>

It is not surprising, therefore, that U.S. military doctrine warns of the dynamic threat of insurgencies:

The contest of internal war is not “fair”; many of the “rules” favor insurgents. That is why insurgency has been a common approach used by the weak against the strong. At the beginning of a conflict, insurgents typically hold the strategic initiative. Though they may resort to violence because of regime changes or government actions, insurgents generally initiate the conflict. Clever insurgents strive to disguise their intentions. When these insurgents are successful at such deception, potential counterinsurgents are at a disadvantage. A coordinated reaction requires political and military leaders to recognize that an insurgency exists and to determine its makeup and characteristics. While the government prepares to respond, the insurgents gain strength and foster increasing disruption throughout the state or region. The government normally has an initial advantage in resources; however, that edge is counterbalanced by the requirement to maintain order and protect the population and critical resources. Insurgents succeed by sowing chaos and disorder anywhere; the government fails unless it maintains a degree of order everywhere.<sup>22</sup>

Consequently, it is a daunting and difficult task to defeat insurgencies that exhibit such complex adaptive characteristics.

Fortunately, Complexity Theory does provide a number of insights for how best to counter competitors advantageously positioned on the edge of chaos. According to Brown and Eisenhardt, the edge of chaos

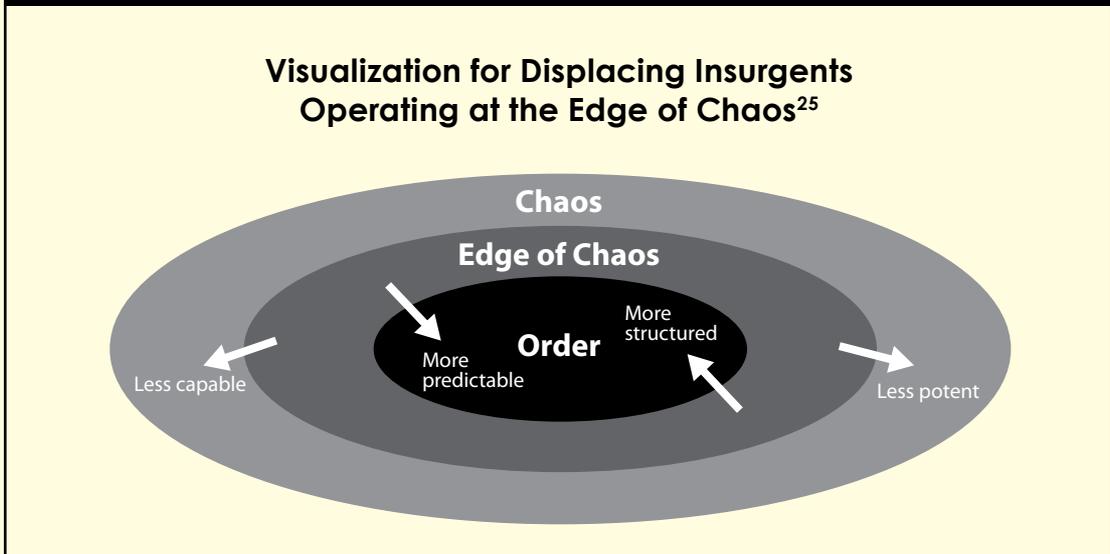
is difficult to achieve because it is so easy to err on either side—to slip into too much structure or too little . . . an unstable edge between two *attractors* (i.e., structure and chaos) that tend to pull the system away from the edge of chaos toward the rigidity of too much structure or the confusion of too little structure.<sup>23</sup>

Therefore, the best way to defeat an insurgency is to push it into chaos, to pull it into order or, better yet, to apply a combination of the two. A sketch showing the edge of chaos as the transition space between the chaos regime and the order regime can help to illustrate how this would occur (see figure 2).

To push the insurgency into chaos, the counterinsurgent can exercise the strategy of *time pacing*—“a strategy for competing in fast-changing, unpredictable markets by scheduling change at predictable time intervals.”<sup>25</sup> Doing so helps the counterinsurgent anticipate change and regain the initiative. As Griffith noted,

The tactics of guerrillas must be used against the guerrillas themselves. They must be constantly harried and constantly attacked. Every effort must be made

**Figure 2**



to induce defections and take prisoners. The best source of information of the enemy is men who know the enemy situation.<sup>26</sup>

However, Griffith failed to address that the insurgency must be pressured along as many lines of operation as possible, not just through direct attacks. Current COIN doctrine affirms this assessment:

When the United States commits to helping a host nation defeat an insurgency, success requires applying the instruments of national power along multiple . . . logical lines of operation (LLOs). Since efforts along one LLO often affect progress in others, uncoordinated actions are frequently counterproductive.<sup>27</sup>

Time pacing is, therefore, about setting and meeting regular deadlines that help to synchronize friendly operations along multiple lines of effort and that overwhelm the enemy with an increased tempo of operations. “By definition, time pacing is regular, rhythmic and proactive,” but as Eisenhardt and Brown warn, “it is important not to confuse time pacing with speed.”<sup>28</sup> Even though successful practitioners of this strategy often operate at a rapid clip, the goal of time pacing is not simply to be fast but to focus one’s own efforts in a way that generates urgency, momentum and predictability so that one’s own activities outpace and disrupt the enemy’s plans. Consequently, the successful application of time pacing helps to apply pressure on insurgencies and induce them into a chaotic state where they become less capable and less potent.

On the other hand, the counterinsurgent can force the insurgent to become more structured. The aim of this strategy is to convince the insurgents, or at least a large segment of their followers, to reconcile with the existing government. Unfortunately,

negotiations with insurgent groups may not produce lasting accord and may even bolster the insurgents' cause, as Griffith counsels:

Revolutions rarely compromise; compromises are made only to further the strategic design. Negotiation, then, is undertaken for the dual purpose of gaining time to buttress a position (military, political, social, economic) and to wear down, frustrate and harass the opponent. Few, if any, essential concessions are to be expected from the revolutionary side, whose aim is only to create conditions that will preserve the unity of the strategic line and guarantee the development of a "victorious situation."<sup>29</sup>

While it is clear that there are hazards in all dealings with insurgents, the use of negotiations can assist the counterinsurgent. Sun Tzu even promotes the position that militaries ought to provide a way for their adversaries to disentangle themselves from battle:

Throw the troops into a position from which there is no escape and even when faced with death they will not flee. For if prepared to die, what can they not achieve? Then officers and men together put forth their utmost effort. In a desperate situation they fear nothing; when there is no way out they stand firm.<sup>30</sup>

However, when negotiations succeed, not only does the counterinsurgent gain a better understanding of his enemy, he may also benefit from a fracturing of the collective will of the insurgency. Negotiated settlements, after all, are critical to the goal of securing a lasting peace.

Regarding the current conflict in Afghanistan, General David H. Petraeus stated the following after assuming command of U.S. Central Command in 2008:

You don't kill or capture your way out of an industrial-strength insurgency. If there are opportunities to identify and then isolate the irreconcilables in certain of these areas and then reach out to the reconcilables, of course that's a preferred course of action.<sup>31</sup>

Recent successes at reducing conflict and bloodshed through engagement include Britain's negotiations with Sinn Fein in 1997, which contributed to diminished violence in Northern Ireland; India's resolution to the Bodo Liberation Tigers insurgency in 2003, which led directly to the disbanding of the insurgent group; and U.S. negotiations with Sunni insurgents in 2007, which helped to prevent an all-out civil war in Iraq. Perhaps President John F. Kennedy stated it best when he advised, "Let us never negotiate out of fear. But never let us fear to negotiate."<sup>32</sup> By inducing a semblance of order into the insurgency through negotiations, the counterinsurgent is able to undermine the insurgent's unity, hamper his initiative and reduce his ability to be as unpredictable.

Of course, where possible, a simultaneous combination of pushing him into chaos and pulling him into order is arguably the most effective way to disrupt insurgent

operations and goals. Because it is unlikely that any single operation will bring about an immediate defeat to an insurgency, it is incumbent that the counterinsurgent attempts all viable methods of gaining advantage on such a cunning enemy. Surprising as it may seem, it is the revamped U.S. strategy in the final years of the Vietnam War that provides a noteworthy example of a COIN force applying direct and indirect pressure on full-blown insurgency. According to historian Lewis Sorley, General Creighton Abrams clearly grasped the object beyond the Vietnam War after assuming the top U.S. military command from General William Westmoreland:

That object was not destruction but control, and in this case particularly control of the population. Abrams also understood that the war was a complex of interrelated contests on several levels, and that dealing with the enemy effectively meant meeting and countering him on each of those levels. “The enemy’s operational pattern is his understanding that this is just one, repeat one, war,” stressed Abrams. “He knows there’s no such thing as a war of big battalions, a war of pacification or a war of territorial security. Friendly forces have got to recognize and understand the one war concept and carry the battle to the enemy, simultaneously, in all areas of conflict.”<sup>33</sup>

Unfortunately, the Vietnam War is generally regarded as a resounding victory for insurgent forces, and the insights from Abram’s COIN strategy have largely failed to gain history’s proper consideration. However, the coalitions in Iraq and Afghanistan are adopting much of what Abrams introduced in Vietnam; current COIN strategy involves pressuring the insurgents simultaneously on as many logical lines of operation as possible.

Through an understanding that the insurgent gains considerable advantage by acting from complexity, the counterinsurgent is armed with knowledge of the importance of dislodging his enemy from the edge of chaos. In doing so, the counterinsurgent regains the initiative, weakens the insurgency’s cohesion and bolsters national unity. Espousing the supremacy of a military able to grasp and act upon such concepts, Sun Tzu wrote:

Now an army may be likened to water, for just as flowing water avoids the heights and hastens to the lowlands, so an army avoids strengths and strikes weakness. And as water shapes its flow in accordance with the ground, so an army manages its victory in accordance with the situation of the enemy. And as water has no constant form, there are in war no constant conditions. Thus, one able to gain victory by modifying his tactics in accordance with the enemy situation may be said to be divine. Of the five elements, none is always predominant; of the four seasons, none lasts forever; of the days, some are long and some are short; and the moon waxes and wanes.<sup>34</sup>

Therefore, to succeed the counterinsurgent must apply continuous pressure to the insurgents from a complex of interrelated contests and preclude them from doing the

same to him. We now examine how mathematics can further help the counterinsurgent rapidly analyze, evaluate and assess courses of action in order to regain operational initiative in the dynamic COIN environment.

### **Popular Support as an Irreducible Markov Chain**

In 1906, Russian mathematician Andrey Markov introduced a theory to help predict the future statistical properties of systems that randomly change over discrete periods of time. Prior to his discovery, it was considered impossible to foretell the exact future behavior of these systems given that they are constantly experiencing changes in seemingly arbitrary ways. However, Markov proved that incredibly accurate forecasts are indeed possible because he recognized that the probability distribution for such a system at the very next time period depends only on the current state of the system and not additionally on the state of the system at previous periods.<sup>35</sup> As a result, he was able to compute with precision the long-term probability distributions and expected values that quantify the behaviors of discrete random systems. Today, Markov Chains are used to model many phenomena of interest in a wide range of areas including genetics, economics, market research, consumer branding and product placement. This section of the paper examines how Markov Chains can be applied to help in the COIN fight by rapidly predicting and assessing long-term popular support within a nation confronting an insurgency.

The importance for the strategist to analyze public sentiment was not lost on Carl von Clausewitz, who wrote:

To discover how much of our resources must be mobilized for war, we must first examine our own political aim and that of the enemy. We must gauge the strength and situation of the opposing state. We must gauge the character and abilities of its government and people and do the same in regard to our own. Finally, we must evaluate the political sympathies of other states and the effect war may have on them. To assess these things in all their ramifications and diversity is plainly a colossal task. Rapid and correct appraisal of them clearly calls for the intuition of a genius; to master this complex mass by sheer methodological examination is clearly impossible. Bonaparte was quite right when he said that Newton himself would quail before the algebraic problems it could pose.<sup>36</sup>

While such a task remains a challenge even in the present day, current technology has helped to ease the burden. In today's globally connected world, people have access to real-time information that yields current demographic conditions. News organizations attempting to provide a current snapshot of a situation condense data into simple graphs that seem to give an unambiguous picture of popular sentiment. Consequently, governments engaged in a COIN campaign gauge success or failure through the day-to-day changes provided by the media's latest charts measuring popular opinion. But

rather than focusing on the *current distribution* of the population states revealed by an opinion poll, Markov Chain analysis asserts that to predict how a population's support for its government changes over time, the most appropriate effort is to analyze the *transition probability* of the population states.<sup>37</sup> The example that follows demonstrates how modern mathematics can help to resolve a critical element of warfare that Clausewitz believed was too complicated to calculate.

Consider a country where an insurgency has started in response to a suspension of government services. This country's population has three different states: 1) pro-government, 2) neutral and 3) pro-insurgency. Further consider that as time progresses the population can move from one state to another. Suppose that in the beginning of our analysis, virtually all of the population (100 percent) is pro-government, but after certain civil services have ceased, the population begins to shift. If there is no improvement, during each subsequent month 85 percent of the population remain pro-government, while 10 percent of the population shift toward neutral and 5 percent become agitated enough to support the insurgency. Also, of those who become neutral, 15 percent return to being pro-government, 70 percent stay neutral and 15 percent become dissatisfied and begin to support the insurgency. Finally, of those who become pro-insurgents, none return to the pro-government camp, while 10 percent revert to neutral and 90 percent remain committed to the insurgency. Finally, assume that these probabilities—known as *transition probabilities*—remain the same from period to period (see figure 3).

At the end of one month, the population goes from being initially 100 percent/0 percent (pro-government/neutral/pro-insurgency) to 85 percent/10 percent/5 percent, and after a second month it changes to 74 percent/16 percent/10 percent. The mathematics of determining popular support at the end of the first month is as follows. The percentage of people who are pro-government is the sum of those who stayed pro-government from the initial month, plus those who moved to pro-government from neutral, plus those who moved to pro-government from pro-insurgency:

$$(85\% * \underline{100\%}) + (15\% * \underline{0\%}) + (0\% * \underline{0\%}) = 85\%.$$

Similarly, the percentage of those who are neutral is calculated as:

$$(10\% * \underline{100\%}) + (70\% * \underline{0\%}) + (10\% * \underline{0\%}) = 10\%.$$

Finally, the percentage of those who are pro-insurgent is:

$$(5\% * \underline{100\%}) + (15\% * \underline{0\%}) + (90\% * \underline{0\%}) = 5\%.$$

For the end of the second month, pro-government support is calculated as:

$$(85\% * 85\%) + (15\% * 10\%) + (0\% * 5\%) = 74\%.$$

And the calculations continue in the same manner until the numbers do not fluctuate from period to period and long-term equilibrium is achieved.

**Figure 3**

### Sample Transition and Distribution Probabilities for a Nation Facing an Insurgency

Transition Probabilities

		From		
		Pro-Government	Neutral	Pro-Insurgency
To	Pro-Government	85%	15%	0%
	Neutral	10%	70%	10%
	Pro-Insurgency	5%	15%	90%

Distribution Probabilities Over Time

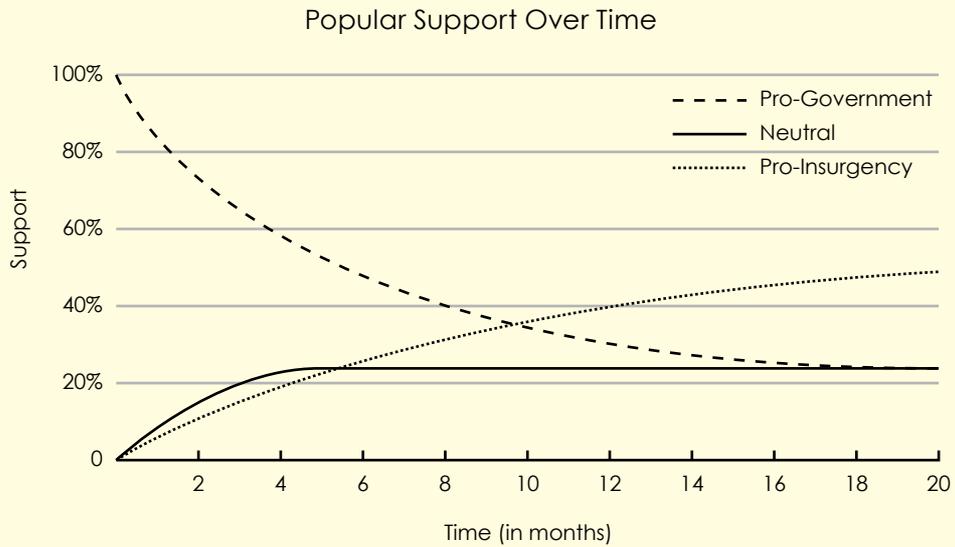
	Time Period		
	Initial Distribution	After One Month	After Two Months
Pro-Government	100%	85%	74%
Neutral	0%	10%	16%
Pro-Insurgency	0%	5%	10%

If, however, we fail to continue calculating until we arrive at the long-term equilibrium, it will appear as though the pro-government camp continues to receive the bulk of the popular support even though the insurgency with a small foothold appears to be gradually gaining strength. However, Markov Chain analysis shows that over time, nearly 50 percent of the population eventually ends up supporting the insurgency, with 25 percent of the population neutral and 25 percent of the people supporting the existing government—25 percent/25 percent/50 percent (see figure 4). These percentages are known mathematically as the equilibrium percentages for this system or equilibrium distribution of the Markov Chain.<sup>38</sup>

Consider the same population, but this time instead of having the population start off as being 100 percent pro-government, it will begin by being 100 percent neutral. While a different dynamic exists during roughly the first ten periods, the long-term population distribution converges once again to 25 percent/25 percent/50 percent (see figure 5). In fact, the initial starting state does not impact the long-term or equilibrium behavior of an irreducible Markov Chain. This remarkable property clearly indicates

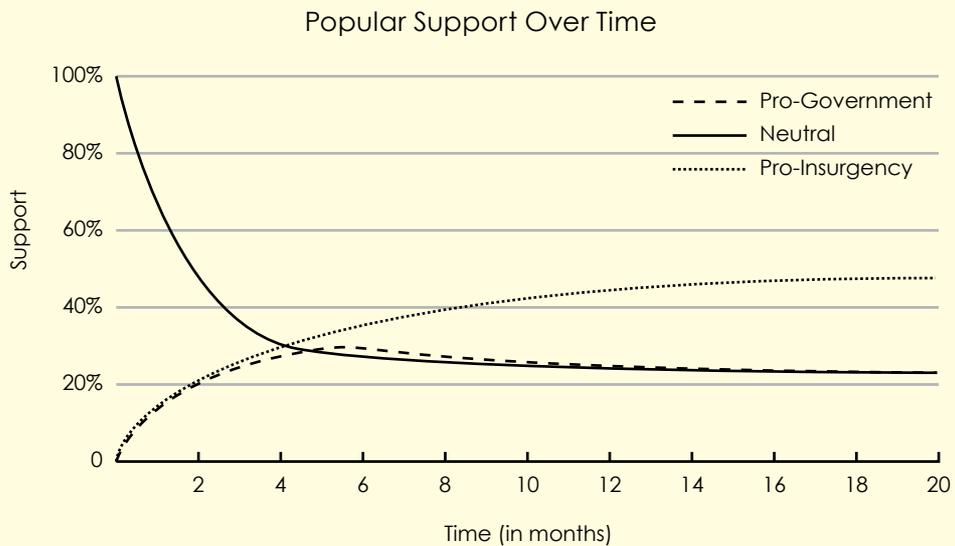
**Figure 4**

### Long-term Demographics of a Nation at the Equilibrium Distribution



**Figure 5**

### Initial Probability Distribution Irrelevant to Long-Term Trend



that it is more important to analyze the transition between states than to simply obtain a snapshot of the population demographics at the current point in time. From a mathematical perspective, little can be gained from focusing on up-to-the-moment poll results that may not provide an accurate picture of long-term trends. On the other hand, considerable insight is unveiled through the analysis of a system's transition probabilities. Therefore, the skilled counterinsurgent concentrates greater effort and resources on analyzing and assessing the best courses of action that will induce changes to improve government legitimacy and erode insurgent support.

Basing his conclusions on anecdotal evidence, Griffith points out:

Historical experience suggests that there is very little hope of destroying a revolutionary guerrilla movement *after it has survived the first phase and has acquired the sympathetic support of a significant segment of the population*. The size of this “significant segment” will vary; a decisive figure might range from 15 to 25 percent.<sup>39</sup>

If these deductions are correct, an insurgency does not even need to attain support from a majority of the population to succeed—as indicated in the example used throughout this section of the paper. Therefore, it is fitting that U.S. military doctrine recommends that to succeed in a protracted war against insurgents,

The populace must have confidence in the staying power of both the counterinsurgents and the [host nation] government. . . . Preparing for a protracted [COIN] effort requires establishing headquarters and support structures designed for long-term operations.<sup>40</sup>

COIN plans that employ Markov Chain analysis, as a consequence, help not only to disclose the enduring commitment required of the operations but, more important, to communicate that comprehensive success is achievable with the appropriate political objectives, situational understanding, levels of resources and rules of engagement.

It is important to note that if a COIN campaign is indeed a long war that is fought for the hearts and minds of the people, Markov Chain analysis provides a rapid way to assess long-term public sentiment. It is also a mathematical tool that offers an objective way to effectively compare competing courses of action. Additionally, it provides the counterinsurgent with a logical way to communicate long-term success and a suitable way to appeal for the national support required to achieve victory. Finally, military planners can employ it to calculate the prospects for COIN campaign success even before the campaign begins. And while the study of Markov Chains may be a novel concept for most military practitioners, its conclusions have long been considered essential by military theorists who have attempted to gain a better understanding of the complex mass encompassing warfare. Thus, Markov Chain analysis endows operational and strategic leaders with a bit of the genius Clausewitz espoused—it provides

them with an eloquently simple articulation of some of warfare's most complicated ideas. The counterinsurgent is, thereby, able to demonstrate his skill in applying the Manoeuvrist Approach by promoting policies and strategies that best achieve the desired end state.

### **Conclusion: Enhancing the Art of Warfare with the Science of Warfare**

With the growing realization that insurgencies are becoming the preferred method by which armed groups illegitimately usurp control of a nation, today's militaries must resolve to change in order to successfully counter these irregular and complex threats. This paper shows that through the application and understanding of modern science, traditional militaries can improve the operational art of warfare which "demands creative and innovative thought to find broad solutions to operational problems."<sup>41</sup> This paper shows that military leaders can leverage science to gain a better understanding of insurgencies and, in doing so, they can then translate that knowledge into the development of COIN plans that have a greater chance of success.

Some will disparage the introduction of *science* into the accustomed *art* of warfare, asserting that the principles introduced here have not been tested in battle and may turn out to be irrelevant for future conflicts. After all, it was Sun Tzu who wrote the appropriately titled *Art of War* upon which much of the Manoeuvrist Approach has its foundations. But returning to the Taoist and Eastern philosophies that helped to formulate the Manoeuvrist Approach, it is hard to dispute the simplicity, contemplation and naturalness that can be found in the topics introduced here. Through a better understanding of insurgencies that a bit of science can provide, this paper attempts to enhance the art of COIN warfare.

Some will denounce the theories in this paper as not being new, concluding that it does very little to advance either scientific knowledge or military thinking. Considerable literature already exists on the topics of Disruptive Change, Complexity Theory and Markov Chains. Furthermore, much has already been written on revolutionary warfare and COIN strategy. However, according to British mathematician and biologist Jacob Bronowski,

The progress of science is the discovery at each step of a new order which gives unity to what had seemed unlike. . . . Science is nothing else than the search to discover unity in the wild variety of nature—or more exactly, in the variety of our experience.<sup>42</sup>

It is the intent of this paper to introduce greater insights on successful COIN concepts through the unity between the science and the art of warfare.

Finally, some will criticize the principles introduced here for not providing any major breakthrough ideas that can bring about a conclusive victory to insurgent warfare.

It is true that this paper does not offer any divination that provides the counterinsurgent a decided and unequivocal advantage over his opponent. But General Peter J. Schoomaker, former Chief of Staff of the Army, has advocated that today's military must be an "adaptive and learning organization" that is capable of responding "to significant organizational changes by demonstrating initiative, resilience and innovation at all levels."<sup>43</sup> This culture of innovation and imagination that General Schoomaker envisions requires it to embrace change, welcome the diversity of new ideas and critically test whether such novel concepts are appropriate for the dynamically changing world. Only through such critical examinations can the military theorist gain more certainty from the ideas presented here.

While many military theorists consider the Manoeuvrist Approach best suited for the smaller, more agile insurgent force, this paper demonstrates how the counterinsurgent can regain the operational initiative by leveraging the modern scientific principles of Disruptive Change, Complexity Theory and Markov Chains. In so doing, the counterinsurgent is able to more rapidly formulate winning concepts to defeat his cunning opponent. Just as John Boyd advanced military thinking in the aftermath of World War II through methodical investigation, this paper shows how science can enhance COIN doctrine and demonstrates that the Manoeuvrist Approach can prevail against insurgencies in the 21st century and beyond.

### Endnotes

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- <sup>3</sup> Grant Hammond, *The Mind of War: John Boyd and American Security* (Washington, D.C.: Smithsonian Institute Press, 2001), p. 152.
- <sup>4</sup> Sun Tzu, *The Art of War*, trans. by Samuel Griffith (New York: Oxford University Press, 1971), p. 102.

- <sup>5</sup> Samuel Griffith, Introduction to Mao Tse-Tung, *On Guerrilla Warfare*, trans. by Samuel Griffith (New York: Frederick A. Praeger, Inc., 1961), p. 23.
- <sup>6</sup> Joseph Bower and Clayton Christensen, “Disruptive Technologies: Catching the Wave,” *Harvard Business Review*, January–February 1995, p. 43, <http://apps.business.ualberta.ca/mlounsbury/techcom/readings/disruptive%20technologies.pdf>.
- <sup>7</sup> *Ibid.*, pp. 44–45.
- <sup>8</sup> *Ibid.*, pp. 43–51.
- <sup>9</sup> Headquarters, Department of the Army (DA) & Headquarters, United States Marine Corps Combat Development Command (MCCDC), *Counterinsurgency*, Army Field Manual (FM) 3-24, Marine Corps Warfighting Publication (WP) 3-33.5 (Washington, D.C.: DA and MCCDC, 2006), para. 1-24, <http://www.fas.org/irp/doddir/army/fm3-24.pdf>.
- <sup>10</sup> *Ibid.*, p. x.
- <sup>11</sup> *Ibid.*, paragraphs 3-102 and 3-105.
- <sup>12</sup> Mao Tse-Tung, *On Guerrilla Warfare*, p. 68.
- <sup>13</sup> Graph adapted from Bower and Christensen, “Disruptive Technologies,” p. 49.
- <sup>14</sup> Griffith, Introduction to Mao Tse-Tung, *On Guerrilla Warfare*, pp. 5–6.
- <sup>15</sup> DA and MCCDC, FM 3-24/USMC WP 3-33.5, p. ix.
- <sup>16</sup> Bower and Christensen, “Disruptive Technologies,” p. 50.
- <sup>17</sup> *Ibid.*, p. 53.
- <sup>18</sup> Shona L. Brown and Kathleen M. Eisenhardt, *Competing on the Edge: Strategy as Structured Chaos* (Boston: Harvard Business School Press, 1998), p. 131.
- <sup>19</sup> Lashon Booker, Stephanie Forrest, Melanie Mitchell and Rick Riolo, Introduction to *Perspectives on Adaptation in Natural and Artificial Systems*, ed. by Lashon Booker et al. (Oxford: Oxford University Press, 2005), pp. 1–3.
- <sup>20</sup> Brown and Eisenhardt, *Competing on the Edge*, p. 14.
- <sup>21</sup> John Nagl, *Learning to Eat Soup with a Knife: Counterinsurgency Lessons from Malaya and Vietnam* (Chicago: University of Chicago Press, 2002), p. 22.
- <sup>22</sup> DA and MCCDC, FM 3-24/USMC WP 3-33.5, para. 1-9.
- <sup>23</sup> Brown and Eisenhardt, *Competing on the Edge*, p. 29.
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- <sup>27</sup> DA and MCCDC, FM 3-24/USMC WP 3-33.5, para. 2-7.
- <sup>28</sup> Eisenhardt and Brown, “Time Pacing,” p. 60.
- <sup>29</sup> Griffith, Introduction to Mao Tse-Tung, *On Guerrilla Warfare*, p. 22.
- <sup>30</sup> Sun Tzu, *The Art of War*, p. 134.
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- <sup>32</sup> President John F. Kennedy, Inaugural Address, Washington, D.C., 20 January 1961, <http://www.bartleby.com/124/pres56.html>.
- <sup>33</sup> Lewis Sorley, *A Better Way: The Unexamined Victories and Final Tragedy of America's Last Years in Vietnam* (New York: Harcourt Brace & Co., 1999), pp. 17–18.
- <sup>34</sup> Sun Tzu, *The Art of War*, p. 101.
- <sup>35</sup> J. R. Norris, *Markov Chains* (Cambridge: Cambridge University Press, 1997), p. xiii.
- <sup>36</sup> Carl von Clausewitz, *On War*, trans. and ed. Hans Gatzke (Harrisburg, Pa.: The Military Service Publishing Co., 1943), pp. 585–586.
- <sup>37</sup> Sam Savage, *Decision Making with Insight* (Belmont, Calif.: Brooks/Cole, 2003), p. 142. The example used in this section of the paper is adapted from the chapter entitled “Markov Chains,” pp. 141–145.
- <sup>38</sup> *Ibid.*, pp. 142–143. Savage reveals how determining Markov Chain equilibrium is relatively simple using a spreadsheet and the = MMULT function.
- <sup>39</sup> Griffith, Introduction to Mao Tse-Tung, *On Guerrilla Warfare*, p. 27.
- <sup>40</sup> DA and MCCDC, FM 3-24/USMC WP 3-33.5, para. 1-134.
- <sup>41</sup> Great Britain Ministry of DCDC, *Joint Operation Planning, Joint Warfare Publication 5-00* (Shrivenham, UK: DCDC, 2004), para. 207.
- <sup>42</sup> Jacob Bronowski, *Science and Human Values* (New York: Julian Messner, Inc., 1956), pp. 26–27, [http://sciencepolicy.colorado.edu/students/envs\\_5110/bronowski\\_1956.pdf](http://sciencepolicy.colorado.edu/students/envs_5110/bronowski_1956.pdf).
- <sup>43</sup> Peter J. Schoomaker, Foreword to Nagl, *Learning to Eat Soup with a Knife*, p. ix. The learning organization concept for the U.S. military comes from Nagl’s assertion that the United States lost in Vietnam because it was not a learning organization. This conclusion, however, is contradicted by Sorley, who praises Abrams for his innovation, drive and understanding of what it took to defeat an insurgency after assuming command from Westmoreland. Nonetheless, Nagl’s overall conclusion may be correct in that the U.S. military did not learn fast enough and, perhaps more important, was unable to adequately communicate its newfound Manoeuvrist Approach to a war-weary public and administration.

