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MASTER OF MILITARY STUDIES

**Cognitive Savagery:
Using Science Metaphors to Understand Complex Problems
and Enable Force Structure Design**

SUBMITTED IN PARTIAL FULFILLMENT
OF THE REQUIREMENTS FOR THE DEGREE OF
MASTER OF MILITARY STUDIES

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“...the officer who has not studied war as an applied science,
and who is ignorant of modern military history,
is of little use beyond the rank of Captain.”

Field Marshal Garnet Joseph Wolseley, British Army
Letter to Capt. Walter H. James, editor, *The Wolseley Series*
19 April 1897

Preface

When I began this work I was a captain just two months out of the operating forces and four years removed from a theater of active combat operations. At that time, I observed the Marine Corps wrestle with its purpose in the future while simultaneously reconciling from over a decade of conflict. I found myself witnessing senior leaders attempting to convey a fierce sense of pride in our accomplishments while explaining that the U.S. Marine Corps needed to return to “its roots” or “normal business.” No doubt to any junior leader, officer or enlisted, the sentiment of “returning to normal business” stands counter to the established norm of the opening decade of the 21st Century. I came to understand that persistent conflict, first defined by my personal involvement and then rigorous study, was the norm. It was then I realized that I wanted to better understand why what our institution trained to do seemed to not align with what the Nation was asking it to do. I merely would like to present a method of thought to better understand our changing environment, to know what implications the deeply interwoven construct of modern society has for military planners, and to fulfill the obligation every leader has from time to time in stressing the resiliency of the doctrine of the organization he or she belongs.

In this process I owe much to the Marines that I have had the privilege to lead in numerous adventures across the globe, to the leaders that have guided me on my path and shown patience in my errors, and to my faculty advisors and master’s degree program mentor who’s erudite ways encouraged the expansion of my *bildung* at this moment in my life. Most important, to my wife, to my children, and to my parents – you are the assemblage of my system that can never be compactified to an unreachable dimension.

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Executive Summary

Title: Cognitive Savagery: Using Science Metaphors to Understand Complex Problems and Enable Force Structure Design

Author: Major Travis L Hord, United States Marine Corps

Thesis: Understanding the modern character of global issues and designing solutions to maintain national power requires informative multi-disciplinary methods bounded in durable metaphors.

Discussion: National leaders of all branches and departments are confronting foreign policy issues that are testing the capacities and resilience of the existing instruments of national power. It has become readily apparent that the growing complexity of each issue demands an ever-increasing ability to understand a problem, design a solution, and implement action to resolve the myriad associated requirements. While complex problems have always existed in the world, the ways and means to confront security issues must be updated to meet the challenges of the modern era. The alarmingly swift proliferation in the functions and applications of, and reliance on, technology has altered the world's collective view as compared to that of just two decades ago. Issues that world leaders and their cabinets took weeks or months to critically consider and act on are now subjects that anyone with access to the Internet can immediately rally behind, donate money to, criticize, or actively fight against. Clearly this shift, in both understanding and method, poses a new problem-set for governments that are charged by their population to exercise power in the pursuit of their ascribed national interests. This work intends to demonstrate that by combining an understanding of apposite sciences, both hard and soft, bounded to the tenets of military organizations with durable metaphors leaders of government and military endeavor can better understand the systems in the environment in which we live, thereby allowing superior design to fight and win among interactively complex systems.

Conclusion: To comprehend and design solutions to the manifold dilemmas presented by an increasingly interconnected world, leaders must utilize every possible aspect when developing solutions to the full spectrum of potential crises. While the method hypothesized applies to all levels and types of decision-making, the warfighter can use the metaphors of hard and soft science bound to institutional tenets to better design methods of threat assessment, force generation and training, procurement and equipping, and the ultimate selection and application of will-influencing military force.

PROLOGUE – SEEKING INSTITUTIONAL PHASE CHANGE

The U.S. Marine Corps has dwelled at a qualitative inflection point between planning processes and systemic design for nearly three decades. Senior leaders claim to espouse the meaningful perspective gained through iterative discourse bounded in common frameworks to formulate hypotheses.¹ Though, if this truth is so prevalent, why does the pathologic behavior to resist institutional change persist? Describing “phase change”² in the book, *Systems Thinking: Managing Chaos and Complexity*, Jamshid Gharajedaghi answers the question by noting, “Social systems display a tendency to repeat themselves and reproduce the same set of non-solutions all over again.”³ Although the efficiencies offered by systemic design⁴ created genuine excitement when first introduced, insecurities reinforced by fear of the unknown stymied full institution wide acceptance and implementation. In order for systemic design and other methods of creative thought to emerge as a method holistically recognized to understand problems, the attractors of design must continue to educate the force with the most pervasively understood institutional rhetoric. For the U.S. Marine Corps, an institutional change of phase is required.

DILEMMA FOR ALL TIME

The dilemma of reconciling political existence, the nature and character of war, and the ways and means of organizations is timeless for nations and states. Enacting and rescinding the admixture of sociopolitical elements toward a mutual end is a reality of existence. All leaders must understand that answering basic questions such as, “Where are we now? What do we have? Where do we want to go? What do we want to get?” establish the initial conditions of interactively complex systems.⁵ Though, answering the cascading possibilities these questions present is anything but simple. In an ever-changing world, nation-states and other human groups can only create the ways and means they need to exist and prosper if they understand how constituent elements emerge from the interactions of systems.

Understanding the modern character of global issues and designing solutions to maintain national power requires informative multi-disciplinary methods bounded in durable metaphors.

Creating resilient systems to attain political goals is the unending toil of statesmen and soldiers. Despite attempts to limit social disorder, the introduction of violence remains an unassailable requirement to effect human will. As such, failing to recognize the fundamental enactment of politics within war is the greatest of all possible strategic errors. National leaders must work continuously to give their militaries the means to discern the aims of policies and respond with positive actions, violent or otherwise, as well as to identify order in the midst of apparent randomness. Leaders must also equally recognize the dangers of seeking solutions to complex problems through the use of formulaic processes. The meaningful perspective gained by expanding the limits of

structure capacity and social system interaction is required to fully meet the demands of today's complex national security needs.

METAPHORS LIVED

Leaders charged to sustain a vision and apply resources within constraints must allow for a most important truth – the social metaphor chosen to convey ideas constitutes cognitive reality.⁶ In his essay “Why Metaphors Matter,” Dr. Alan Beyerchen explains the value of implicit comparison and how leaders and organizations can best utilize the literary function to maintain organizational resilience. Dr. Beyerchen notes,

Metaphors form part of our cognitive processing embedded in systems of images and meanings, systems that cohere in the form of cultures and ways of perceiving the world. Attention to how metaphors do this pays off in clearer thinking, better cross-cultural relations and greater openness to change and difference. Each of these means better anticipation of possibilities. Better anticipation of possibilities enhances adaptation to new or changing circumstances. Greater adaptiveness offers advantages wherever we can obtain it.⁷

A simple examination of language used throughout history reveals many figures of speech that transfer descriptions of objects beyond their effect. The longest lasting metaphors are not resilient because they are rhetorically superior. Rather, enduring metaphors linguistically bond people, ideas, and things in such a comprehensive manner that realities are bounded within the mental image. This understanding also cautions that living a maladaptive metaphor ends in a short-lived existence. To holistically impart systemic design to the U.S. Marine Corps a model allowing for tacit understanding of the method is required. A precondition to adopting such a model is identifying language and imagery natural to the maritime profession that is also rooted in the history of warfighting. In this search, the institution should emulate the example of a most influential writer who

expressed ideas metaphorically, the Prussian military theorist Carl von Clausewitz.⁸

The words of Clausewitz have stood as an abiding resource for generations of martial scholars seeking to understand the fundamental nature of war while resolving its mutable character.⁹ Clausewitz understood well that intuition and recognition of pattern could only be girded by experience. By capturing his experiences so vividly in the written form, Clausewitz enabled the readers of his work to live all that is war - devoid of real danger. It is the intractable metaphors of social action described by the sciences that have allowed his masterwork, *On War*, to remain a definitive resource nearly 200 years after its initial publication.

Dr. Antulio Echevarria II aptly described Clausewitz as, “the quintessential cerebral savage” in an essay entitled, “Clausewitz’s Center of Gravity: Changing our Warfighting Doctrine-Again!”¹⁰ Although modern theorists and admirers of Clausewitz’s work will never know exactly what he was thinking, it is of great importance to appreciate he utilized the intellectual models of the leading philosophers and scientists to describe the characteristics of war.¹¹ Barry D. Watts demonstrates this point further through a modern recasting of “Clausewitzian friction” in which he examines the mutable character of war when influenced by modern technology.¹² In his work, “Clausewitzian Friction and Future War,” Watts offers an important passage concerning Clausewitz, the notion of friction in systems, and his familiarity with contemporary sciences:

Friktion, like Clausewitz’s notion of the opponent’s center of gravity, was undoubtedly borrowed from Newtonian physics¹³ via Kantian concerns about how physics was possible as a body of knowledge. ...Clausewitz was familiar with these Newtonian and Kantian ideas and, even in *On War*, invoked the mechanistic image of the army as a machine whose internal friction “cannot, as in mechanics, be reduced to a few points.”¹⁴

Indeed, Clausewitz was not at all timid in finding apposite metaphors to demonstrate his observations of violent social interactions. Further, Watts uses Dr. Beyerchen's persuasive argument from a 1993 essay that Clausewitz himself perceived war, "as a profoundly nonlinear phenomenon...consistent with our current understanding of nonlinear dynamics."¹⁵ A reinforcing assertion that difficulties in understanding that which is offered by *On War*, the combination of social science and appropriated physics, can be attributed to linear processes and thought. Clausewitz purposefully formed his metaphors of performative behavior in social systems with the most progressive scientific language available in his time. For this reason, when testing new methods, *On War* remains a fundamental constant from which to deviate and then compare.

Clausewitz's metaphors of social systems and the sciences remain absolutely valid. However, the sciences he utilized to construct his metaphors have advanced in considerable ways. What cognitive method would Clausewitz savagely choose within the fields of hard and soft science to create his metaphors today? Would he still utilize physics and mathematics? Would he be moved that gravitational waves predicted by Albert Einstein are observable?¹⁶ Would he recognize the dualism of the Theory of Relativity and Quantum Mechanics as total and limited war? Would he use elements of String Theory as a model for force design construct? With the political realm remaining central, which method would he utilize to describe technological advances and the parity of human and non-human elements in a system? Again, we will never truly know what Clausewitz was thinking when he developed his theories and the metaphors by which he described them – but that does not matter. Creatively thinking about these questions

through intellectual discourse to solve modern complex problems will serve to expand the bounds of rational thought.

Aggressively cultivating modern “cognitive savages” is absolutely necessary for the U.S. Marine Corps to remain a resilient and lethal force. Carl von Clausewitz constantly sought through his own *bildung*¹⁷ to develop as a scholar and a leader. Perhaps the reason *On War* remained unfinished before his death was that his internal discourse continuously grew as he learned and experienced new things.¹⁸ Likewise, educating the current and future leaders of the institution using the most progressive technological and sociological means bounded to the tenets of warfigthing is vital. The central aim is to develop leaders to use all methods available to better understand and explain the interactively complex phenomenon of war. Non-linearity is perhaps satisfied when the metaphors of a 18th and 19th century Prussian officer emerge as continued reality for 21st century leaders.

THEORY RENEWAL IN THE AGE OF EVERYTHING

Will, the resolve to exist and the purposeful methods used in obtaining the desired state of existence, remains as the chief attribute of the human condition. The account of human endeavor is an interwoven construct of social systems made manifest through the application of will. No matter the climate of the region, the scarcity of natural resources, the abundance of desired goods for trade, the moral condition of the working class, or the role of the agreed upon government, a supreme binding force – will –exists. Will and social interaction, however, do not exist alone in an ethereal state of shared philosophies. Also resident in the nature of the human is the need to place order upon concepts and ideas of individuals that translate to the mandates and constitutions of groups, states, and nations. The urge to construct a recognizable and predictable system of inputs and outputs is an intrinsic feature of human thought and action. Though, to a single person or a society defined by national ideas, the variable and often violent world backdrop of action and consequence demonstrates a linear approach to being that is impossible. The sheer vastness of human cognitive possibility in an unforgiving world portends a ceaseless pursuit of ways and means to achieve any desired end. Attempting to place order upon ostensive social chaos is truly a daunting task. Although societies and nations do this very thing just as they attempt to understand the order of the material universe in which they live.

Considering the order of the universe is not unlike grappling with understanding social human construct. In the anthropic landscape¹⁹ there exists a vast array of galaxies containing uncountable solar systems, an incomprehensible number of celestial bodies, and a binding force barely perceivable by the noble yet fledgling attempts of man. In

spite of the infinite bounds the observable universe presents, human nature defaults to properly categorizing and defining every possible material state, thereby claiming the ability to stand resolute in the knowledge gained by daring to ask. As a people existing in the universe and interacting within complex social systems contained within that universe, we must constantly challenge the bounds of what is directly observable, what is generally accepted as a norm, and how an understanding of the physical world connected to the social system benefit a people attempting to will order upon their existence.

Lofty philosophical musings, while useful to expand one's thought horizon, are of little use in the governance of a nation or the application of military power against an adversary. Why then is it even relevant to attempt to use a modern view of the human social construct with an understanding of the universe that cannot be entirely unified to explain anything? Robert O. Work, the United States Deputy Secretary of Defense, hinted to this pursuit in part by saying, "the 'Age of Everything' is the era of grand strategy," while discussing the delicate nature of stewarding national resources amidst an alarming increase in global contingencies.²⁰ More poignantly answered, for leaders of a nation-state searching for the ways and means to guarantee continued existence in a mutable world, the answer is simple – understand the evolving global system and design methods to affect that system in the furthering of self-interest or *be consumed by that system* and enter quietly in to the pages of history.

Understanding the modern character of global issues and designing solutions to maintain national power requires informative multi-disciplinary methods bounded in durable metaphors. Rapid globalization aided by the technological explosion of the 20th Century has profoundly changed the interaction of states, societies, and transnational

non-state actors. Maintaining acceptable levels of order in a highly interconnected, unstable world is becoming increasingly difficult. The metaphors leaders use to craft strategy and project power must be constantly refreshed. By coupling the theoretical physics model of String Theory with the Actor-Network Theory of the social sciences a useful model emerges to link technologically connected societies still underpinned by human will.

LINKING PHYSICS WITH SOCIAL SCIENCES TO INFORM DESIGN

Understanding threats and opportunities, both internal and external, while exercising logic and applying resources to achieve goals has been the function of every society and those who lead them throughout history. Political survivability also requires having an understanding of the environment and forcefully effecting change or foreseeing and enabling inevitable occurrences.²¹ The methods by which one derives strategy and the means to achieve it must be an iterative process grounded in this truth. By this logic, in 2016, one searching to design anything involving interactions of social systems within an environment should seek to create or use existing theoretical models that fully explore the bounds of current understandings.

Theoreticians in any field frequently make sound observations and discoveries before methods or means accurate enough to test them exist. In constrained settings where answers are needed, being entirely attuned to the environment while studying observable occurrences will allow new insights to present themselves. The notion of observing anomalous behavior in an otherwise controlled environment is a reality of physicists and sociologists seeking truths in their fields as well as martial practitioners in search of methods in a most unforgiving field of study. As such, the field of physics has

yielded a valuable concept that seeks to unify gravity and quantum mechanics that also has a predictive element. Called “String Theory,” this yet-unproven but sound framework has the potential to be the “theory of everything” and a very apt model from which to base thought about force structure design.²² Equally as useful is the Actor-Network Theory from the field of social science. This study links things and concepts in “material-semiotic” networks while giving equal value to both human and non-human actors within those networks.²³ Each theory, once understood in a meaningful way, gives credence to better understanding of more aspects of an environment with multiple dimensions to be considered in highly technologically developed social systems.

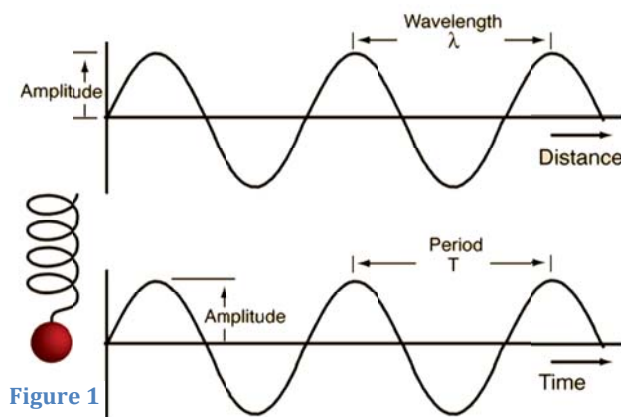
There is great risk of the ill effects associated with mixing hard and social science. However, there is equally rational benefit to viewing the capabilities and capacities of our strategic design and force structures at fundamental levels in a technologically driven society during this national inflection period. In a world where current models and theories are faltering against the prevailing threats, it is most prudent to find an envisaging method that combines human and technology interacting within competing systems and fundamental constants to the most elemental level. It is most intriguing that within the basis of each theory, there exists a similar relation to what is observable and how to treat that which is not. This linkage helped form the development of this study and the search for influencing design in a complex world.

RESONATING COMPONENTS TO FORM A SYSTEM

General Frederick Kroensen Jr. (USA Ret.), Vice Chief of Staff of the Army from 1978 to 1979, wrote an essay in 2013 entitled, “Remembering a Sine Wave: A History of Feast and Famine for the U.S. Army.”²⁴ In this article, the practice of downsizing the U.S. Army force structure and funding levels at the conclusion of major conflict is compared to the function of a sine wave. His argument details the link between relative unpreparedness at the onset of major conflict due to the lack of resources allocated for the U.S. Army in the periods between conflicts. It is not surprising that in January 2016, Army Chief of Staff General Mark Milley reaffirmed this sentiment as reported in the Army Times,

The United States has a long history of being unready at the beginning of conflict...we in the Army, we leaders in the Army, cannot allow ourselves to fall into that historical pattern. We have a moral and ethical obligation to our soldiers and the American people.²⁵

This obligation to understand society while utilizing mathematical comparisons serves as



a central foundation for coupling the use of theoretical physics models to better understand binding forces of will and capability within systems structure.

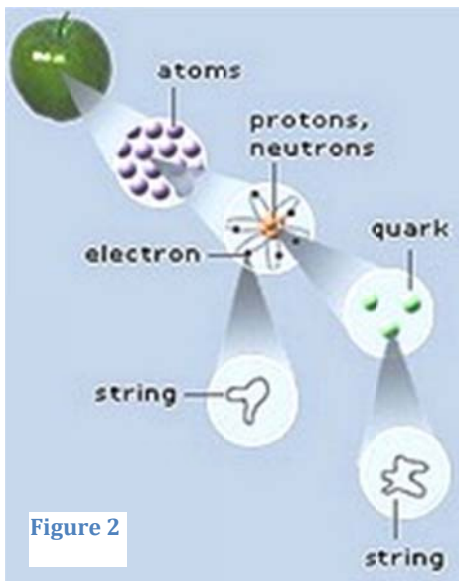
The function of sine is highly useful in describing repetitive oscillation of a given subject such as sound or light. When placed on a graph, the peak deviation from 0 is the amplitude, the distance between those peaks is the wavelength, and the number of occurrences repeating in a unit of time is the frequency. In Gen. Kroensen’s example, the wave is representative of the high levels of

readiness at peaks of conflict and low levels of readiness during the troughs of relative peace. However, many different factors that could be used to derive military preparedness are also present but untouched in his association. This example is slightly misleading as the function of sine repeats itself uniformly over defined intervals called periods. Further, the waveform being demonstrated by the sine function is in two dimensions that can be captured and easily graphed using whole numbers. However, the myriad factors determining the execution of tasks and standards in training translating to success against a given enemy cannot be so easily captured. Despite this, the comparison is unique in that the sinusoidal function can be used to represent the varying levels of inputs and outputs to a given system over time.

The fluctuation of system inputs as a function of sine is very important to understand how human action can relate to theoretical physics models. A visual depiction of state defense spending between wars shows that monetary expenditure declines rapidly at the close of conflict and increases sharply once the next conflict has been signaled. Missing from that representation is any empirical evidence that a military force given less in terms of budgetary allocation also declines in effectiveness. The single factor of defense spending then must be assumed as one of many factors that can be attributed to levels of military capacity and capability. Thinking of the fluctuation of these many individual factors as a bundle of waves in concert with each other as the basis of how a system (in this case a military) will act suggests comparisons to how the universe is said to operate in string theory. Once this basic connection is made, the use of the string theory concept opens the way for a greatly enhanced view of how systems operate and influence each other.

STRING THEORY FOR THE SOCIAL

Generally, massive schisms exist in the subject matter that physicists study. For example, one segment of physics examines very small things, like atoms and sub-atomic particles, while the other segment studies massive bodies such as stars and galaxies.²⁶ The result of this schism is that on each extreme, a group may exclusively choose to use the findings provided by either quantum mechanics or general relativity – but not both. However, a unified understanding is needed, as the universe is a place of extremes: within a black hole, an object of enormous mass can be crushed to an infinitesimal size. The physicist Brian Greene describes such a theory, string theory, as a “single theoretical



tapestry” having the ability to “interweave all of nature’s forces and material constituents.” String theory, Greene states, does this by positing, “Everything at its most microscopic level consists of combinations of vibrating strands.”²⁷ These vibrating strings are the final level in the microscopic progression of atoms, electrons, neutrons, protons, and quarks.

In string theory, elementary “particles” obtain their properties of mass and force charges by the resonating pattern of vibration caused by the internal strings.²⁸ The amplitude of the vibrational string patterns determines the amount of energy in a particular particle and thus its mass. More frantic vibration equals more energy and in turn creates a greater mass and ability to sustain particle structure. As the mass determines the gravitational properties of a particle there

is a direct association between string vibration and reaction to gravitational force.²⁹

Consistent ideas follow for messenger particles³⁰ as well, particularly concerning vibrational string patterns that perfectly match the properties of the graviton. For string theory, this most important linkage ensures gravity is essential as a unifying feature.³¹

The method by which physicists associate between the vibrational patterns and force charges are of chief importance. Greene gives a basic description of the mathematical process:

When the motion of a string is quantized, its possible vibrational states are represented by vectors in a Hilbert space, much as for any quantum-mechanical system. These vectors can be labeled by their eigenvalues under a set of commuting hermitian operators. Among these operators are the Hamiltonian, whose eigenvalues give the energy and hence the mass of the vibrational state, as well as operators generating various gauge symmetries that the theory respects. The eigenvalues of these latter operators give the force charges carried by the associated vibrational string state.³²

For the mathematically oriented reader, this singular quote makes the entire connection between what can be observed and graphically depicted and how to describe that which cannot. As such, abstract comparison is meaningless unless understood. The most important aspect is the notion of the “motion of a string” being quantized, that being the restriction in the value of data sets of a system so the variables are easier to represent.³³ Greene also offers a metaphorical description by noting, “observed particle properties...[are] just as the strings on a violin or on a piano having resonant frequencies at which they prefer to vibrate – patterns that our ears sense as various musical notes and their higher harmonics – the same holds true for the loops in string theory.”³⁴ The strings, either open or closed like a loop, determine the particle type based upon the way they vibrate³⁵ just as elements in a system, when altered, change that very system. Using math

or music as a transport, this most important set of findings is where the first parallel exists to the inner workings of social systems.

Taking the sine wave comparison of Gen. Kroensen Jr. and treating it as a base component open string in a particle, the function of each string component's interaction, or vibration, in that particle, or system, dictates the operation of the aggregate. In other words, the oscillating variance of a single factor attributed to a tangible or non-tangible input to a system over time is determined by its structure and thus the output of that system. For example, in a military unit, many factors determine effectiveness of that formation in relation to the purpose for which it was created. Tangible factors such as quantity of troops, effective range of artillery pieces, and other materiel items can be assessed to determine relative combat power. Intangible factors such as morale, trust between the enlisted and officer corps, and the feeling of loyalty to one's collective or nation, also exist. In the realms of both the tangible and intangible factors, as a result of interaction, many millions of combinations of those factors exist that determine the capability of that military unit. That capability, however, must be derived by the purposeful design of that artificial social system within a projected environment. The same comparison can be drawn for achieving profit in a small business, maximizing commuter throughput on surface city streets, or determining how enmity can best serve a politician seeking office. At this point, the comparison holds firm, but the most elusive question remains unanswered. How does a planner determine the most intangible strings of a system, like fear of violence or belief in a vision statement, in order to influence the tangible elements of that system at a particular time? As such, the similar problem of calculating the influence of vibrating strings on subatomic particles in space-time exists

within the mathematical equations of string theory.³⁶ For this problem, a most interesting solution has been put forth.

It has been calculated that in order to observe a single string within a particle, a device is needed with the ability to observe to the level of “Planck length.” This size is nearly unimaginably small: a millionth of a billionth of a billionth of a billionth of a centimeter (10^{-33} centimeter) in length. To place in slightly more comprehensible terms, Planck length would be roughly the height of a typical tree if an *atom* were expanded to the size of the *known universe*.³⁷ For string theory to survive as a possible unified model, it is necessary to increase the number of

independent coordinates, or dimensions, when specifying any point within space-time. For superstring theory, the number of space-time dimensions required is 10.³⁸ In a four-dimensional world (height, length, width, and time), there is no way to readily observe the extra six dimensions.³⁹

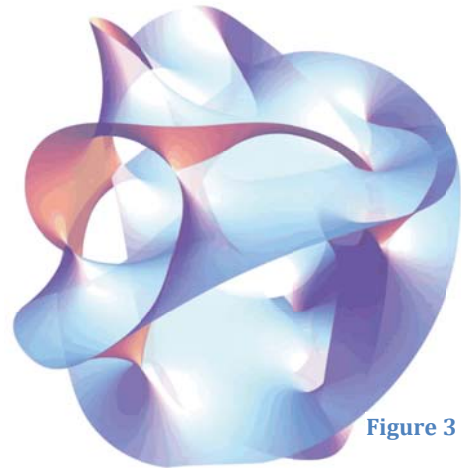


Figure 3

However, superstring theory experimentations have found through the concept of “Kaluza-Klein compactification,” the six unobservable dimensions can be curled into “Calabi-Yau shapes” in space, making the 10 dimensional world of string theory appear to be the 3+1 (where +1 is the dimension of time) dimensions in our observable world.⁴⁰ Again, as this work only seeks to use the model of string theory for a social comparison; the mathematical equations will not be introduced. Although the mathematical theorem is wholly important, focusing on the metaphoric aspect instead is perhaps welcomed as the thought of multiple dimensions does at first make string theory and its comparison to

social systems even more complex. Although the opposite is in fact the case when the full implication of what really knowing the shapes of the hidden dimensions are and what that means for how strings interact within them.

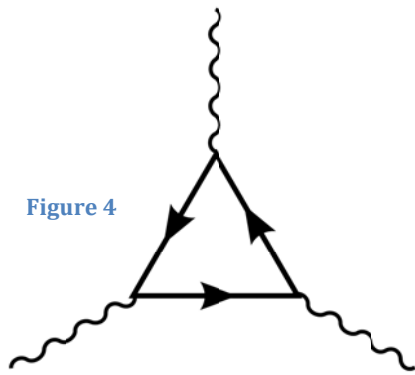
If one considers the metaphor of the workings in brass musical instruments as compactified dimensions a useful visual manifests. For a French horn, the curvature of the brass tubing and correlation of valve combinations coupled with compressed air from the vibrating lips of the player all combine to create its distinctive tones. If the length of tubing or amount of air permitted to pass through each valve is altered, the notes produced by the instrument will be changed.⁴¹ The shape of the dimension that the vibrating air is passing through directly enables the musical notes to be produced as desired. Physicists, such as Greene, use this comparison to directly parallel the calculation of the fundamental operations of the universe. If the shape of the compactified dimensions could one day be precisely measured physicists could “calculate the allowed notes,” or predict the particles, that are produced within each dimension.⁴²

A REMARKABLE CONVERGENCE

The following conceptual merger warrants further study by a higher authority in the field of physics. That being said, great intrigue may arise in a possible link between Clausewitz’s “remarkable trinity” and the modern technique to represent the behavior of subatomic particles. The essay titled, “Reclaiming the Clausewitzian Trinity,” written by Edward J. Villacres and Christopher Bassford, convincingly argues the intended forces comprising the trinity representing war as a “total phenomenon.”⁴³ Dynamic interaction between the forces of violence, chance, and subordination to rational policy⁴⁴ preclude any linear operation or predictable processes in war. The nonlinear nature of the trinity

reinforces the assertion that Clausewitz was intuitively describing anomalous interaction between elements. Linking this interaction to physics is easily made by visual comparison of anomalous gravitational occurrences.

In order to visually represent particle paths with the initial and final states of quantum systems, physicists use Feynman diagrams. These diagrams allow the otherwise unintuitive long formula in the abstract to be quickly visualized and manipulated. When representing anomalies or asymmetric behavior in “Gauge symmetry,” which is necessary to translate gravitation through the graviton,⁴⁵ the Feynman diagram manifests



at the one loop level with bosons, or force carriers, attached. For the everyday observer seeking connections in disparate fields of study, the anomaly is a triangle where each side represents a fundamental force⁴⁶ with friction exiting from each corner. In this regard, it is possible to suggest Clausewitz’s attempt to reconcile total war and limited war by use of the trinity serves the exact purpose of a Feynman diagram visually representing anomalies in the coupling of fundamental forces. It is absolutely amazing to think the lasting metaphors of Clausewitz could be made even more profound by further exploration of modern scientific research.

The use of the predictive element string theory as a metaphor in designing force structure does not at all portend to predictability in war. As is well known, the chaos of war precludes any meaningful attempt to place order upon it. The focus of using a performative design method is to create a structure that allows maximum capacity without the need to insert additional capability. If these connections are accepted, then

the use of fundamental particle structure to guide force design to interact in complex systems is absolutely natural. Though the compactified dimensions offered by string theory cannot be seen, theorists do have the ability to closely examine the social systems present in our observable environment.

Understanding the environment and correctly determining the dimension through which a means should be introduced from one system to another is the most important step in any design process. Useful to senior leaders and planners is a process by which a determination can be made about how one system should enter in to another system in order to create a desired effect. More precisely, leaders must be given viable options about what means and ways need to be utilized to achieve the desired outcome. Theorists can break down and analyze component parts of the system and locate the coordinates, or specific elements of a system, being influenced by various sources of will. This breakdown and analysis can only be achieved, however, if a unified design is applied to solve a truly defined problem with a force of the correct structure. Before reaching that level, the next required aspect is truly defining a problem in terms of understanding an adversary, or a competing system, in its environment. The inclusion of the Actor-Network Theory is central to achieve the highest degree of competing system enactments in an increasingly technologically interconnected world.

RENDERING ACTOR-NETWORK THEORY

If one were to sample a number of posture statements currently presented by the combatant commands, a connecting thread would immediately emerge. Although the notion may stand counter to reason because each command is globally dispersed (some non-contiguously) and is assigned a clearly distinct mission with varying capabilities. If each example examines the wide-ranging contingencies aimed to stabilize circumstances with unique sociopolitical factors, geographic nuances, and technological influences, how could a connecting link exist? By simply understanding that each posture statement goes to great effort in describing a heterogeneous litany of human and material factors, the common thread becomes obvious. The posture statements are an attempt to capture the various elements of their respective systems and cursory intimations of how they interact. However, the statements are presented in the abstract as if the battlespace were being defined in a textbook and the forces, present or programmed, to accomplish the mission are monolithic and separable from the environment. If the United States is to utilize its designed military forces to maintain relative dominance across the globe, throughout every domain, the systems in which those forces operate must be examined with rigor. Current methods are nominally adequate, but the performative nature of the Actor-Network Theory (ANT) in describing system enactments shows tremendous potential for national leaders and military planners.

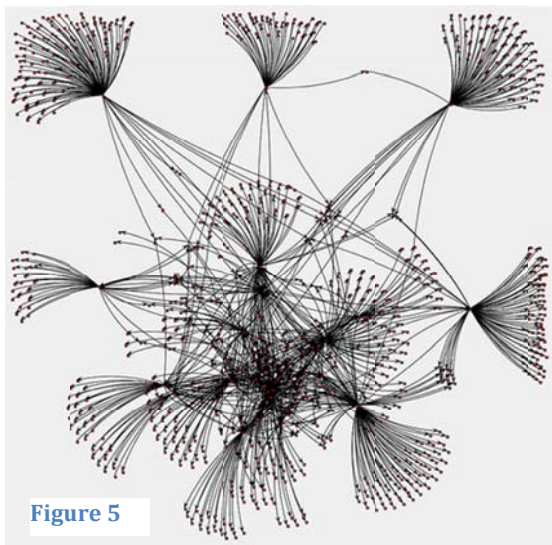
Origins of the Actor-Network Theory, a term first offered by Michel Callon, can be placed in Paris between 1978 and 1982. The approach, according to its own footings, is a network itself extending in to “time and place,” thus making accounts of origin subjective.⁴⁷ Self-describing the arbitrary nature of beginnings and focusing on

expanding interaction is in of itself an aspect that is descriptive and telling of potential use. John Law, a sociologist and exponent of ANT, defines the theory as, “a disparate family of material-semiotic tools, sensibilities and methods of analysis that treat everything in the social and natural worlds as a continuously generated effect of the webs of relations within which they are located.”⁴⁸ Law contends that ANT is less of a theory to explain why something happens and more of a descriptive method about how relations are constructed. The essence of ANT is more aptly revealed by focusing on the “material-semiotics” aspect: the simultaneous relation between things (material) and concepts (semiotic).⁴⁹ Only when the elements in a system, or network, are appreciated for their enactments with each other, and not their mere existence, can meaningful exploration of those systems be conducted.

A quick examination of a case study provided by Law further illuminates the method. His question was modest, “how did the Portuguese reach India, maintain imperial control, and establish a system allowing them to control half of the world?”⁵⁰ Law noted that traditional history puts forth demand for spices, military power, trade routes, and Christianity were the causal factors. Some credence is given to maritime technological innovation in terms of shipbuilding and navigation, but these factors, though essential, are less of concern. Law also points out that very little emphasis is given to the politics or economic drivers resident in imperialism. Law’s answer distinguished ANT as a distinctive approach to social theory. He believed the, “ships, sails, mariners, navigators, stores, spices, winds, current, astrolabes, stars, guns, ephemerides, gifts, [and] merchants’ drafts were all translated into a web.” That web,

intricate as it may have been, allowed each individual element to have a distinct shape or form within the asymmetric structure for nearly 200 years.⁵¹

Further analysis of this study will show the expression of the system through the ANT. The myriad elements, human and non-human, technology and ideas, and motives and politics express the heterogeneous actors comprising the system. Further, how the actors shape and define each other demonstrate the semiotic relationality throughout the system. If any one of the elements did not fulfill its role in the network processes at any



time, the cohesion would have been lost, and the system would have fallen apart. Lastly, the method brought out power as an effect, and the creation of immutable mobiles⁵² in vast spaces to translate distant actors within the extended network configuration.⁵³ This study also demonstrates the ability to minimize

ontological distinctions within a system. By eroding foundational precepts, the exploration of heterogeneous actors can lead to unexpected emergences.⁵⁴

The most controversial foundation to be confronted is ANT's insistence on regarding human and non-human actors within systems as equal elements. Though it may be the most important as humans and the technology created to support societies reach parity. However, of the dualisms unfastened by the relational effect of translation, the post-humanistic concern is of little analytical importance. Other foundational abatements, according to Law, include, "meaning and materiality, big and small, macro

and micro, social and technical, and nature and culture.”⁵⁵ Law mitigates dualism as a relational effect saying, “whether ‘big’ or ‘small,’ the largest part of the webs (systems) we draw on and allow us to act are hidden.”⁵⁶ To put in other terms, as the system expands and becomes increasingly complex, so do the metrics used to measure and recognize expanse of the system. To simplify these emergences of increasing agency within a system “black boxing” becomes a necessary component. “Black boxing,” a term specific to ANT but widely understood in different semantics, simply means giving focus to the durable output and interaction of a system and ignoring the internal drivers.⁵⁷ If the “black box” oversimplifies the system being examined, then it must be re-opened to identify more meaningful actors. With this concept of durability devoid of foundation, meaningful system operations present themselves as performative effects rather than explanatory foundations. As with compactification, metaphorically demonstrating the function of that which is not directly observable allows action to continue until more precise methods are obtained.

The concepts provided the Actor-Network Theory are only a more thorough description of the “Single-Battle Concept.”⁵⁸ Commanders abiding by the single-battle concept are already well aware that events in one part of a battlespace may have consequential results on other areas and forces. Using material-semiotics as an approach to further integrate may serve to increase effectiveness of forces within the battlespace.

With any theory, the only way to verify the outcome is to take the concept out of the abstract and test it. For military leaders, this process means continually assessing the environment and maintaining the state of forces to meet the requirements of national policy. Practitioners of military affairs must unhesitatingly hazard the combination of

hard and social sciences to enable the design of force structures. Informing decisions that impact national security using the most relevant contributions of multiple fields of study is not a matter of academic choice; it is a matter of necessity. The institutional metaphors bounding force design and doctrine must be able to translate fundamentally performative structures adapting to achieve success within emergent system enactments. To this end, the United States Marine Corps, as the “Nation’s Crisis Response force,” is seeking to balance resources between the requirements of current commitments and future needs through Marine Corps Force 2025.⁵⁹

TOWARD PERFORMATIVE STRUCTURING - MARINE CORPS FORCE 2025

As the nation seeks the ways and means to maintain relative mass in the global system, so too must each component element of its national power. The luxuries of an inter-war period are not going to be offered within the current threat forecast. While remaining forward deployed, the United States Marine Corps is making tremendous efforts to remain a lethal, efficient force for the nation. Senior leaders meeting the challenges of future force design are faced with the same timeless questions:

What capability is needed? Who is the opposing force? What is the environment? To a force with limited resources in an era of persistent conflict with the potential to combat state actors along with irregular threats, these questions cannot be taken lightly. The ends of design construct must be the development of a force able to meet steady-state operations while retaining the capability to responsively deploy in support of major combat operations. Setting the correct conditions for institutional change are vital.

In order to create an innovative environment, the metaphors chosen to convey force design must be bound to the object force itself. The creativity needed cannot cease

at the creation of a new catch phrase or acronym. Bounding force development efforts in durable institutional metaphors will increase receptiveness to change while offering the foresight to enhance the adaptability to new structures. Using a modern lens to apply the lessons of Clausewitz offers the U.S. Marine Corps the opportunity to create the forces needed to serve the needs of the nation. The metaphors found in *Performative Structuring* may serve as starting point.

Perhaps the greatest challenge of force design in 2016 is defeating the dualism of countering regular and irregular threats. The requirement to conduct conventional operations against state-actors while also countering non-state actors will not soon dissipate. However, as recent conflicts have demonstrated, a military designed and trained to violently counter a peer competitor does not have the same effect when deployed to stabilize governance and enhance infrastructure. Choosing to man, train, and equip to either extreme is an option but presents great risk as conflict uncertainty remains high. The U.S. Marine Corps has proven highly adaptive in these efforts during the past decade of conflict transitions. Scaling Marine Air Ground Task Forces (MAGTFs) to meet the demands of each conflict in its varying stages has been the key. The MAGTF concept is the single greatest strength the U.S. Marine Corps can offer to the nation. The concept itself has taken on a metaphorical meaning to provide a purpose built, relatively self-sustaining, and responsive organization to respond to crisis. The MAGTF metaphor is entirely durable. It is how the U.S. Marine Corps designs, maintains, and employs MAGTFs that will have the greatest effect in the modern battlespace.

By maintaining the MAGTF as the unit of action for the U.S. Marine Corps the versatility and austerity the force imbues will allow for adaptive action, both in training

and combat. The MAGTF serves as a model easily created and destroyed in novel environments. As described in the book *Hidden Order: How Adaptation Builds Complexity* by Dr. John H. Holland, the component elements of the MAGTF can be used and reused in a multitude of scenarios just as a simple set of building blocks played with by a child.⁶⁰ The experience gained by repeatedly using the same building blocks allows perpetually unique circumstances to become much less insurmountable by individuals and organizations. Dr. Holland explains:

This use of building blocks to generate internal models is a pervasive feature of complex adaptive systems. When the model is tacit, the process of discovering and combining the building blocks usually proceeds on a evolutionary scale; when the model is overt, the timescale may be orders of magnitude shorter.⁶¹

The material-semiotic relationship present in the elements of a MAGTF makes it by definition an adaptable system. However, the elements are certainly not mere toys, it is the ability to create desired effects, lethal or otherwise, within opposing systems that must be tested and well understood. Further, coupling MAGTFs as multi-agents to form an aggregate MAGTF presents complications due to the need for an adequate coupling agent or force. In other words, dedicated command elements and staffs not otherwise engaged must be available to properly aggregate MAGTFs to form larger fighting organizations. It may be necessary to retain two fully functioning staffs within the same command element of some MAGTFs to allow for rapid aggregation when necessary. This feature may also allow for self-organizing systems of MAGTFs able to truly operate in a decentralized manner.

The focus of creating a force with maximum resilience instead of robustness is another important aspect force designers must consider. As traditional robust forces are designed to forgo a specific type of failure, the emergence and recognition of increasingly complex enemy systems signal the need for a force accepting of relative failures able to re-organize and adapt swiftly for general success. Antoine Bousquet examines the future of such decentralized networks in the monograph, “Chaoplexic Warfare or the Future of Military Organization.”⁶² Dr. Bousquet convincingly posits, “Decentralized self-organizing systems are inherently better equipped than centralized systems to deal with limited predictability and contingency.”

History has demonstrated, it is the highly centralized organizations that are unable to plan for and produce specifically tailored forces for every possible contingency that collapse in the face of dramatic outlying possibilities. The contrast Dr. Bousquet provides is simple in saying, “decentralized systems of quasi-autonomous units can operate more effectively and with a greater degree of adaptability on the basis of the local calculations of the networked agents constituting them.”⁶³ The natural end to this type of organization bordering disorder and order leads away from MAGTFs existing as nodes extending from a hub and toward “swarms” or “packs” enabled by modern information sharing.⁶⁴ The actions of MAGTFs designed to allow “chaoplexic” behavior will permit dispersed forces to exist in a battlespace that can also



rapidly converge and disperse on opportunities within enemy systems as they present themselves. This type of offensive “pulsing” only displays the principle of mass during an actual attack. Instead of waves attacking from a particular direction, MAGTFs will determine critical vulnerabilities and combine elements as needed to destroy key capabilities of a given enemy system. The prospects of offensive and defensive capabilities of this type of organizational structure are virtually endless. However, it is not new technologies that will enable rapid MAGTF employment. The type of institutional phase change required for performative structuring is ultimately contingent upon doctrinal shifts piloted by leaders willing to accept change.

Proper design construct using performative structuring will allow for a force that has the capacity to accept additional capabilities without fundamentally altering its construct as a unit of action. Improper design will lead to adding capability to structures lacking the capacity to maintain, supply, and employ them. Attempting to accurately predict the correct elements needed in a MAGTF will be met with certain failure. The process of force design must fully account for humans and technology merging within social systems. Further, current methods of deriving governmental and military force structure must be willing to examine current models using a fundamental understanding of binding forces from a multi-disciplinary approach. What then is the ideal MAGTF structure? No singular method or linear approach will answer that question. Solving this problem requires creative thinkers bounded by lasting institutional metaphors. Through rigorous wargaming and experimentation, finding the performative structure required to meet the challenges of today is absolutely possible. Appreciating how physicists use the compactified shapes of particles to predict mass-producing energy will allow for a useful

comparative structure model. Understanding how material-semiotics allows constituent elements to emerge from system interactions will assist in understanding environments. As demonstrated by history, the U.S. Marine Corps will resolve to meet national security challenges and continue to serve as a “team of teams”⁶⁵ to protect the people of the United States.

APPENDIX A:

SHIFTING POLITICAL ENVIRONMENT

When the military historian and theorist Sir Basil Henry Liddell Hart wrote of “grand strategy” in his classic book, *Strategy: The Indirect Approach*, he was speaking of actions taken before and during a war toward the subsequent peace. B.H. Hart knew well that a residual “sorry state of peace” following conflict would lead to the underpinnings of the next war.⁶⁶ The indirect application of national power is highly prudent for a nation-state seeking to maintain stability while preserving resources. A direct parallel of thought exists in the modern era for the United States as it did for Great Britain during the interwar period. Offering methods to strengthen policies and strategies in the modern world must be grounded in avoiding a “sorry state of peace.” In seeking to find or preserve a sound state of peace the implications of military power applied to attain political ends must first be understood within shifting political environments.

National leaders need to reevaluate and validate their strategic guidance to account for global actors using a “gray zone” approach.⁶⁷ In the essay “Strategic Theory and the History of War,” Dr. Daniel Moran states, “the goal of theory in any field is to improve our understanding of reality, and our ability to act effectively.”⁶⁸ Dr. Moran is speaking directly to “strategic theory” as the interface between thought and action in relation to the use of force.⁶⁹ However, what does the use of force entail when the adversary is rarely present on a battlefield or cannot be directly affected by a kinetic energy weapon? What are the implications when a nation-state deploys its military apparatus to counter a collective bearing no national flag, occupying no capitol city or country boundary, and capable of managing human capital and monetary assets from multiple locations with

little to no physical infrastructure? Further, what if the adversary is seeking to achieve its ends through ways and means not presently perceivable as offensive to a nation-state historically focused on existential threats in the form of nuclear weapons or conventional military forces? Perhaps most dangerous, what if through bureaucratic indifference, the development of essential methods and forces to counter the emergent threats are identified but not acted upon? These questions are uncomfortable for a nation-state designed to counter a peer threat within a known timeframe on a declared battlefield. It is these questions, however, that are most important to answer before the difficulties of making change become the regrets of a potential catastrophic national security failure.

CONCERNING POST-WESTPHALIAN COMPLEXITIES

In 1648 the Treaty of Westphalia ended the Thirty Years' War and set the conditions for state self-determination on the European continent. Once ratified, the Westphalian order ushered in the model of secularized state interest and the sovereignty of co-existing states that served as the basis of modern international law.⁷⁰ In the three and a half centuries following the Westphalian Peace, the foundations of European international conduct evolved largely to be the normative behavior of the world. Within that same period, the advances in regulated commerce between nations and a re-defined understanding of limited warfare after the advent of nuclear weapons brought on circumstances just now being wholly realized.

Motivated by profit, inefficiencies of nation-state bureaucracy, or radical religious stance, non-state actors are now wielding influence and power once reserved for elected and despotic leaders alike. National identity is clashing with transnational commerce exchange and territorial conquest has been supplanted by the increase of share in the

world economy.⁷¹ The once harmonious but dissonant relationship now is due in part to state participation in the global economy resulting first in integration and then interdependence of the two entities.⁷² However, the trans-national corporation, an entity not claiming one national home and designed to operate from many different countries, is flourishing in this environment. Recent studies have shown over 51 percent of the world's largest economies are trans-national corporations, not sovereign states. What should be equally as disturbing to governmental leaders is the continued perception among world populations that national and international institutions lack the ability to adequately respond to global issues. More than 40,000 non-governmental organizations are widely accepted as being able to more swiftly identify, publicize, and act upon issues ranging from the results of climate change to the proliferation of weapons of mass destruction.⁷³ This trend exhibits no signs of slowing and should give pause for those searching to further the ends once provided by ways and means of the Westphalian model.

The question for nation-state leaders in 2016 is not if the traditional global system of governance will cease to operate, but when will it fail in its entirety, what are the potentially brutish steps leading to that eventuality, and what are the consequences? As mentioned, the other main factors of globalization and technology expansion are an interdependent pair of conditions accelerating the alteration of traditional rule and conflict. Technology development alone is not a threatening idea and can be generally viewed as a reflection of the state of maturity for the nation or corporation from which it was created. Improving quality of life and increased production by putting the burden of mundane tasks or intricate computations on automated machines and software designed

specifically for that purpose is certainly not a new concept for humans. However, when portions of technology transcend their originally intended use and begin to close existing gaps in social connectivity and ideas, the dynamic changes dramatically. Persistent connectivity and instant communication in multiple domains for entire populations means integration of all people and things in networks is conceivable.

GLOBALIZATION AND TECHNOLOGY

In his book *The Lexus and the Olive Tree*, Thomas L. Friedman points out that when the Cold War dominated the world the two super powers could pick up a single “hotline” to sort out disputes when tensions became too great. Certainly disconcerting for the other nations of the globe with nuclear annihilation a possibility, but at the very least it was understood that two entities were in charge and a method was in place to communicate. Friedman puts forth a modern view of this modus by replacing the “hotline” with the Internet and the appreciation that all people can now connect for the purpose of exchanging in political or economic discourse.⁷⁴ The byproduct, however, is that the nation-state is no longer the only conduit of international dialogue and economic guidance. Instead of populations receiving information on the state of international affairs from their representative governments, the people can now be informed through a multitude of narrow interest news outlets and social-media. Further, power once reserved for a head of state is now diffused and represented by a collective will in all those connected to the worldwide web. Swift change, being relative to the current historical record, on such a massive scale will not be readily accepted or understood by all nations or groups of people.

In many ways, the economic drivers of globalization are directly linked to free-market capitalism and thus Western ideologies and culture. Should it be a surprise that those governments and social systems “left behind” and “brutalized”⁷⁵ by a globalized world do so by linking their failures to the policies of the United States of America? Equally challenging are questions posed by those trans-national entities choosing to stifle change in espousing a rejection of modernity in its holistic form. It would be folly indeed to suggest progress, in its various forms, be halted or slowed in order for less, or contrarily, developed societies to gain equal footing and acceptance. Through a constructivist lens it is necessary in a world with such integration that some unifying artifact exist as to enable the foundation for shared norms and values. Though, presently, the opposite effect has taken hold and the absence of a singular connecting social thread has given rise a toxic amalgamation of opposing views and goals.

For a social construct such as the United States in the modern era, statesmen, soldiers, and citizens are faced with a series of decisions that all have outcomes of great value and even greater uncertainty. Escalating integration of people in networks unbounded by geographic restraint give new challenges to elected leaders and their military counterparts. The decision to focus on internal economic issues will meet sharp criticism from those groups feeling threatened by market expansion of state-actors and international corporations. Paying heed to the reemergence of old state-actor enemies will meet resistance from a populace fearful of seemingly new non-state threats in the homeland. Tension will exist among current senior leaders and their younger subordinates in the form of exploration of alternate methods enabled by technology. The cycle is vicious, and many counter points and examples exist.

How are the statesmen to direct power projection by the military and achieve internal security for a sprawling nation-wide social system containing both tangible and non-tangible vulnerabilities? Perhaps a large majority of prevalent threats currently perceived are not applicable to military force alone. However, the United States finds itself on the heels of two major conflicts in distinct theatres labeled part of a “global war.” Much like the changing description of how power was perceived and divided during the Cold War, the character of war has yet again been transformed due to globalization aided by technology. It has become increasingly apparent the United States severely misjudged the character of conflicts it has been embroiled in during the past decade.⁷⁶ This understanding must be accepted and acted upon by policy makers, as the variation in armed conflict cannot be dismissed as a purely military function. If the retrospective solutions to the most recent conflicts are based upon the failings of the military apparatus in action, then national leaders must embrace that change is required in the manner hard and soft power⁷⁷ is designed and ultimately applied.

The words “Ultima ratio Regum (the final argument),” meaning in modern terms “the last reasoning of Kings,” were etched on the cannon of the French ruler Louis XVI.⁷⁸ These words presupposed the existence of a military force designed to seek decisive engagement against a uniformed adversary using declared violence within some portion of a sovereign territory. The reasoning also assumed that achievable victory could be found in the minds of the opposing leaders, armies, and people. Wars such as this were given names relating to the years, sites of major battles, or cause of which they were fought. The conflict outcomes, though not readily perceivable by the participants and

their nations at the time, had identifiable starting points and a narrowed sense of how to transform their society to win the war and find an amenable peace in the years following.

In the modern era, war being characterized by organized violence is no longer a relatively punctuated and explicit event for the nation. Armed conflict for the individual is just as violent and destructive in terms physical and mental effects. Currently, the national public can digitally receive near real-time battlefield updates and first person video of the efficient savagery attainable on the modern battlefield. As a result, the people of the United States live with situation updates, casualty reporting, and intelligence assessments being provided directly to their homes and offices. Even with this accessibility to conflict information the realities of intimate death cannot be replicated, yet. This nation is split by an insatiable hunger for war and an abject hatred of the human cost when presented in actual form. In some manner, the United States has grown comfortable with the idea that from the horrors of war is born all that is best in life. However, as the need for instant fulfillment increases, so too does the need for the dark and violent counter-life of war. However, something is missing with the causal effects of war and peace. The need for the exuberance of potential death or the pure solace in having retained life cannot be shared collectively by the nation if a constant transitional state between the two exists.

The Congress of the United States has not enacted a declaration of war since World War II. Instead, executive actions and conditional authorizations of military force perpetuate undeclared levels of conflict in loosely defined geographic regions. The implications for periods of protracted low-level military engagement are just beginning to fully emerge to senior leaders. Having a declared enemy allows the government to

engage populace will and mobilize the economic and industrial base of the nation for a time as needed for success. The focus on an enemy represented by a national flag allows defense industry developers to interface with policy makers and innovate at an analytical level. Directed and purposeful training can be programmed in to manpower readiness models across the entirety of military forces based upon reasonably accurate threat assessments. If an outwardly nebulous enemy has no clear leader, then defeat, a force of will born in the mind of the leader, cannot be targeted with clarity.⁷⁹ Further, if an adversary leader accepting of defeat cannot translate to its group that its endstate can no longer be achieved, then enemy threats cannot even agree to cease hostilities. These conditions are aptly described by “persistent conflict” noted by MajGen Michael Symanski (USA Ret.) in a recent article commenting on the changing character of armed conflict:

There are no absolute victories; there are only phases in a permanent struggle to promote and defend our national interests. At each phase, threats are defeated or recede, the international system reconfigures as old powers decline and new powers rise; and at home, resources are redistributed in support of priorities and strategies.⁸⁰

The U.S. Army War College definition of persistent conflict is strikingly similar to B.H. Hart’s resource management, both economic means and human capital, towards sustaining a grand strategy. In order to promote and defend national interests, leaders should seek to derive governmental and military force posture using a multi-disciplinary approach to reconcile tensions presented by “gray zone” actors and “persistent conflicts.”

The immutable work of statesmen and generals is the pursuit of the most efficient ways and means to achieve desired ends. It is, however, of vital importance for leaders to possess a nuanced understanding of how results achieved are “new” or “different-states”

and not “endstates.” What worked for the nation in the last war or even decade may not generate success in the trials of tomorrow. The dualism of the soldier and the statesmen is being eroded by the global character of conflict aided by rapid dissemination of information through various technologies. Leaders of the United States cannot be dismissive of current trends and have the obligation to counter prevailing threats. Only through purposeful discourses within active efforts to maintain stability can apposite forces be developed and deployed in a manner to maintain internal security and global stability.

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- ¹ John F. Schmitt, "A Systemic Concept for Operational Design," Marine Corps Combat Development Command, Quantico, VA, 2006, 3-4.
- ² Jamshid Gharajedaghi, *Systems Thinking: Managing Chaos and Complexity*, (Burlington, MA: Elsevier, 2011), 53.
- ³ Gharajedaghi, *Systems Thinking: Managing Chaos and Complexity*, 52.
- ⁴ Schmitt, John F., "A Systemic Concept for Operational Design," 3.
- ⁵ A system can be described as a set of units or elements interconnected so that changes in some elements or their relations produce changes in other parts of the system and when the entire system exhibits properties and behaviors that are different from those of the parts. Jervis, Robert, *System Effects, Complexity in Political and Social Life*. Princeton: Princeton University Press, 1997, 6.
- ⁶ Alan Beyerchen, "Perspectives on Warfighting – Number 5, Why Metaphors Matter," 1997. Quantico, VA: Marine Corps University, 1997, 4.
- ⁷ Beyerchen, Why Metaphors Matter, 1.
- ⁸ Beyerchen, Why Metaphors Matter, 10.
- ⁹ Carl von Clausewitz. *On War*. ed. Michael Howard and Peter Paret, trans. Michael Howard and Peter Paret (Princeton, NJ: Princeton University Press, 1984), 606.
- ¹⁰ Antulio J Echevarria II, "Clausewitz's Center of Gravity: Changing our Warfighting Doctrine-Again!," Strategic Studies Institute, Carlisle, Pennsylvania, September 2002, 6.
- ¹¹ Echevarria II, "Clausewitz's Center of Gravity," 6.
- ¹² Barry D. Watts, "Clausewitzian Friction and Future War (Revised Edition)," *Institute for National Strategic Studies, National Defense University, McNair Paper 68*, (2004), 2.
- ¹³ It is of importance to note that even Sir Isaac Newton appropriated words such as force, mass, and motion from ancient meaning to enact is theories of material interactions to form the scientific discipline of physics. James Gleick, *The Information, A History, A Theory, A Flood.* (New York, NY: Pantheon Books: 2011), 7.
- ¹⁴ Barry D. Watts, "Clausewitzian Friction and Future War," 22.
- ¹⁵ Barry D. Watts, "Clausewitzian Friction and Future War," 67-68.
- ¹⁶ Patrick Tucker, "Einstein's Gravitational Waves Confirmed," defenseone.com, 11 February 2016, <http://www.defenseone.com/technology/2016/02/einsteins-gravitational-waves-confirmed/125874/>.
- ¹⁷ No direct English translation to *bildung* exists. General Gerhard von Scharnhorst understood *bildung* to mean "the perfectibility of an individual's character and intellect through education." Charles Edward White, *The Enlightened Soldier: Scharnhorst and the Militarische Gesellschaft in Berlin, 1801-1805* (Wesport/Connecticut/London: Praeger, 1989), xii.
- ¹⁸ Dr Antulio J. Echevarria II, personal email to author, 17 February 2016
- ¹⁹ Brian Greene, *The Elegant Universe: Superstrings, Hidden Dimensions, and the Quest for the Ultimate Theory*. New York: W.W. Norton & Company Inc., 1999, 167.
- ²⁰ Bradley Peniston, "Work: 'The Age of Everything is the Era of Grand Strategy.'" *Defenseone.com*, 2 November 2015, <http://www.defenseone.com/management/2015/11/work-age-everything-era-grand-strategy/123335/>.
- ²¹ "The art of statesmanship is to foresee the inevitable and to expedite its occurrence." Charels Maurice de Talleyrand (1754-1838 AD), Vaugn, After Westphalia, 4.
- ²² Greene, *The Elegant Universe*, 104.

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- ²³ John Law, 'Actor Network Theory and Material Semiotics', version of 25 April 2007, (Lancaster University), <http://www.heterogeneities.net/publications/Law2007ANTandMaterialSemiotics.pdf>, 6.
- ²⁴ Frederick Kroesen, GEN (USA Ret.), adapted from "Remembering a Sine Wave," Association of the United States Army, (Washington, DC : August 2013).
- ²⁵ Michelle Yan, "Top Army General Outlines Plans for New Brigades, New Technologies," *Armytimes.com*, 21 January 2016, <http://www.armytimes.com/story/military/pentagon/2016/01/21/army-chief-outlines-plans-new-brigades-new-technologies/79129834/>.
- ²⁶ Greene, *The Elegant Universe*, 6.
- ²⁷ Greene, *The Elegant Universe*, 6.
- ²⁸ Greene, *The Elegant Universe*, 69.
- ²⁹ Greene, *The Elegant Universe*, 69.
- ³⁰ Greene, *The Elegant Universe*, 60.
- ³¹ Greene, *The Elegant Universe*, 69.
- ³² Greene, *The Elegant Universe*, 69.
- ³³ "A systematic manner developed by physicists over the course of more than 50 years, the classical equations are converted into a quantum-mechanical framework in which probabilities, uncertainty, quantum jitters, and so on are directly incorporated...the momentary quantum-mechanical creation of virtual string pairs—with the number of loops determining the precision with which quantum-mechanical effects are accounted for, Greene, *The Elegant Universe*, 173.
- ³⁴ Greene, *The Elegant Universe*, 11.
- ³⁵ Brian Greene, "Making Sense of String Theory, TED Talk," YouTube video, April 23, 2008, https://www.youtube.com/watch?v=YtdE662eY_M.
- ³⁶ Brian Greene, "Making Sense of String Theory, TED Talk".
- ³⁷ Greene, *The Elegant Universe*, 130.
- ³⁸ Greene, *The Elegant Universe*, 108.
- ³⁹ Greene, *The Elegant Universe*, 86.
- ⁴⁰ Greene, *The Elegant Universe*, 96.
- ⁴¹ Greene, "Making Sense of String Theory, TED Talk".
- ⁴² Greene, "Making Sense of String Theory, TED Talk".
- ⁴³ Edward J. Villacres and Christopher Bassford, "Reclaiming the Clausewitzian Trinity," *strategicstudiesinstitute.army.mil*, originally in *Parameters* Autumn1995, <http://strategicstudiesinstitute.army.mil/pubs/parameters/articles/1995/1995%20villacres%20and%20bassford.pdf>, 13.
- ⁴⁴ Villacres and Bassford, "Reclaiming the Clausewitzian Trinity", 9.
- ⁴⁵ Greene, *The Elegant Universe*, 61.
- ⁴⁶ Greene, *The Elegant Universe*, 9.
- ⁴⁷ John Law, 'Actor Network Theory and Material Semiotics', 25 April 2007, (Lancaster University), <http://www.heterogeneities.net/publications/Law2007ANTandMaterialSemiotics.pdf>, 3.
- ⁴⁸ Law, 'Actor Network Theory and Material Semiotics', 2.
- ⁴⁹ Law, 'Actor Network Theory and Material Semiotics', 2.
- ⁵⁰ Law, 'Actor Network Theory and Material Semiotics', 7.
- ⁵¹ Law, 'Actor Network Theory and Material Semiotics', 7.

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- ⁵² In the Portuguese case study the immutable mobile(s) are the ships within the fleet. These ships did not reconfigure their shape while playing their role in the system. Rather, the ships maintained their rigid physical form while transporting ideas and goods throughout the distant edges of the system. The ship was the “thing” that translated the “concept”. Law, John, ‘Actor Network Theory and Material Semiotics’, 14.
- ⁵³ Law, ‘Actor Network Theory and Material Semiotics’, 7.
- ⁵⁴ Law, ‘Actor Network Theory and Material Semiotics’, 8.
- ⁵⁵ Law, ‘Actor Network Theory and Material Semiotics’, 8.
- ⁵⁶ Law, ‘Actor Network Theory and Material Semiotics’, 8.
- ⁵⁷ Law, ‘Actor Network Theory and Material Semiotics’, 10.
- ⁵⁸ Headquarters US Marine Corps. *Marine Corps Planning Process*. MCWP 5-1. Washington, DC: Headquarters US Marine Corps, 24 August 2010, 1-6.
- ⁵⁹ Headquarters United States Marine Corps, *FRAGO 01/2016: Advance to Contact*, 19 January 2016.<http://www.hqmc.marines.mil/Portals/142/Docs/CMC%20FRAGO%2001%2019JAN16.pdf>, 3.
- ⁶⁰ John H. Holland, *Hidden Order: How Adaptation Builds Complexity*. (Reading, Massachusetts: Addison-Wesley Publishing Company, 1995), 34.
- ⁶¹ Holland, *Hidden Order*, 37.
- ⁶² Antoine Bousquet, “Chaoplexic Warfare or the Future of Military Organization,” *International Affairs* 84:5, 2008, 915.
- ⁶³ Bousquet, “Chaoplexic Warfare or the Future of Military Organization,” 925.
- ⁶⁴ Bousquet, “Chaoplexic Warfare or the Future of Military Organization,” 928.
- ⁶⁵ HQ, USMC, *FRAGO 01/2016: Advance to Contact*, 12.
- ⁶⁶ B.H. Hart, Liddell, *Strategy, Second Revised Edition*. London: Meridian, 1991, 322.
- ⁶⁷ Gray zone conflicts fall outside the of traditional nation-state peace-or-war construct. “Actors taking a “gray zone” approach seek to secure their objectives while minimizing the scope and scale of actual fighting. In this “gray zone,” we are confronted with ambiguity on the nature of the conflict, the parties involved, and the validity of the legal and political claims at stake. These conflicts defy our traditional views of war and require us to invest time and effort in ensuring we prepare ourselves with the proper capabilities, capacities, and authorities to safeguard U.S. interests.” *Statement of General Joseph L. Votel, U.S. Army, Commander United States Special Operations Command, Hearing Before the House Arms Services Subcommittee on Emerging Threats and Capabilities*, March 18, 2015, 7.
- ⁶⁸ Moran, Daniel, “Strategic Theory and the History of War”, in John Baylis, James Wirtz, Eliot Cohen, and Colin S. Gray (eds.) *Strategy in the Contemporary World*. New York: Oxford University Press Inc., 2002, 1.
- ⁶⁹ Daniel Moran, “Strategic Theory and the History of War”, 1.
- ⁷⁰ Michael Vaughn, ‘After Westphalia, Whither the Nation State, its People and its Governmental Institutions?’, Paper presented at The International Studies Association Asia-Pacific Regional Conference, 29 September 2011.
<https://espace.library.uq.edu.au/view/UQ:266787/AfterWestphalia.pdf>, 4-6.
- ⁷¹ Vaughn, “After Westphalia”, 8.
- ⁷² Vaughn, “After Westphalia”, 9.

⁷³ Vaughn, “After Westphalia”, 12.

⁷⁴ Thomas L. Friedman, *The Lexus and the Olive Tree*. New York: Farrar, Straus and Giroux, 2000, 8.

⁷⁵ Friedman, *The Lexus and the Olive Tree*, 8.

⁷⁶ Steven Metz, “Counterinsurgency and American Strategy, Past and Future,” *World Politics Review*, 24 January 2012, <http://www.worldpoliticsreview.com/articles/11248/counterinsurgency-and-american-strategy-past-and-future>.

⁷⁷ Colin S. Gray, “Hard Power and Soft Power: The Utility of Military Force as an Instrument of Policy in the 21st Century.” Strategic Studies Institute, US Army War College, April 2011, 43.

⁷⁸ Moran, “Strategic Theory and the History of War”, 1.

⁷⁹ MajGen Michael Symanski (USA Ret.), “War is Extinct, and We Miss It! Part 1: What Happened to War.” *cicerimagazine.com*, December 2015, http://ciceromagazine.com/opinion/war-is-extinct-and-we-miss-it-part-1-what-happened-to-war/#_edn1.

⁸⁰ Symanski, “War is Extinct, and We Miss It! Part 1: What Happened to War?”.

Annotated Bibliography

Beyerchen, Alan, "Perspectives on Warfighting – Number 5, Why Metaphors Matter". 1997. Quantico, VA: Marine Corps University, 1997.

The central aim of this work demonstrates the importance of metaphors in language. The use of metaphors within the U.S. Marine Corps is key to setting the conditions to allow for change during a period of force structure design and innovation.

Antoine Bousquet, "Chaoplexic Warfare or the Future of Military Organization," *International Affairs* 84:5, 2008.

An essay that thoroughly defines the enterprises of militaries as networks increasingly operating toward decentralized organizations and employment methods. This work is utilized primarily to reinforce the potential of decentralized MAGTFs operating with "chaoplexic" behaviors to enable the swarming effect intended for units designed using "performative structuring."

Dawid, Richard, "Scientific Realism in the Age of String Theory". 2007. URL: <http://philsci-archive.pitt.edu/id/eprint/3584> (accessed 2015-11-04).

This article demonstrates that the fundamental structural and methodological differences that set string theory apart from other physical theories have important philosophical consequences. Focusing on implications for the realism debate in philosophy of science, it is argued that both poles of that debate face new problems in the context of string theory. It is wholly relevant to the course of String/ANT theory as the constructivist view is required for utilization in practical application.

Carl von Clausewitz. *On War*. Edited by Michael Howard and Peter Paret. Translated by Michael Howard and Peter Paret (Princeton, NJ: Princeton University Press, 1984).

This book is the unpublished work of a Prussian military theorist that captures the essence of war's nature while reconciling with its mutable characteristics dependent on policy. It is used as the basis of military development and employment within the political undertakings of nations and states.

Friedman, Thomas L. *The Lexus and the Olive Tree*. New York: Farrar, Straus and Giroux, 2000.

This work examines "globalization" in accounts given by the author through his own experiences. The author posits the world is transforming in two distinct ways that clash against each other. The first portion of the transformation is the drive for continual development, growth, and prosperity that transcends national boundaries. The second, and seemingly degrading effect, is the reluctance to shed traditional identities, social methods, and agreed upon norms. This work is relevant to the String/ANT theory for military planners as understanding when to apply military force in a world split between two understandings of power recognition is crucial in modern planning and decision-making.

Gray, Colin S., "Hard Power and Soft Power: The Utility of Military Force as an Instrument of Policy in the 21st Century." Strategic Studies Institute, US Army War College, April 2011.

SSI monograph discusses hard and soft power within the context of military application in the 21st Century.

Greene, Brian, *The Elegant Universe: Superstrings, Hidden Dimensions, and the Quest for the Ultimate Theory*. New York: W.W. Norton & Company Inc., 1999.

This book written by the theoretical physicist Brian Greene thoroughly provides the foundations and implications of String Theory. Greene's work presents the description of the component elements of the theory in a manner that is easily understood by mathematicians as well as an interested mind. The work is the basis of metaphorical comparisons to warfighting and the use of modern science.

Brian Greene, "Making Sense of String Theory, TED Talk," YouTube video, April 23, 2008, https://www.youtube.com/watch?v=YtdE662eY_M.

TED Talk thoroughly summarizes string theory concepts and linkages between developments of earlier theoretical physics models.

Hart, B.H. Liddell, *Strategy, Second Revised Edition*. London: Meridian, 1991.

From one of the seminal thinkers on military and political strategy, this book examines a host of wars and those who led the nations in them. The book serves as a guide from which to base strategy by observing and understanding various accounts within military history.

John H. Holland, *Hidden Order: How Adaptation Builds Complexity*. (Reading, Massachusetts: Addison-Wesley Publishing Company, 1995), 34

A work that describes a perspective of the world where interactively complex systems define the reality of existence. The book artfully illustrates how constituent elements of systems are meaningless until they are rendered in relation to interactions of other elements within space and time.

Headquarters US Marine Corps. *Marine Corps Planning Process*. MCWP 5-1. Washington, DC: Headquarters US Marine Corps, 24 August 2010.

This US Marine Corps Warfighting Publication details the planning process utilized by commanders and staff within that organization.

Headquarters United States Marine Corps, *FRAGO 01/2016: Advance to Contact*, 19 January 2016. <http://www.hqmc.marines.mil/Portals/142/Docs/CMC%20FRAGO%2001%2019JAN16.pdf>.

This document is the planning guidance given by the 37th Commandant of the Marine Corps, General Robert B. Neller. The guidance outlines the security environment and sets the necessary force readiness goals to meet national obligations.

Jervis, Robert, *System Effects, Complexity in Political and Social Life*. Princeton: Princeton University Press, 1997.

This book offers the basic concepts of systems theory. The argument of the explores the varies interactions of groups and people and how those interactions are connected in ways not readily predictable.

Frederick Kroesen, GEN (USA Ret.), adapted from “Remembering a Sine Wave,” Association of the United States Army, (Washington, DC : August 2013).

This article examines the periods between major conflicts the Unites States Army has participated in and the effect of downsizing and preparedness levels as a result.

Latour, Bruno, *Reassembling the Social, An Introduction to Actor-Network-Theory*. New York: Oxford University Press Inc., 2005.

From perhaps the most prominent proponent of Actor-Network Theory, the author exhaustively examines “assemblages” in the context of Society. His conclusions necessitate the differentiation between current constructs of social phenomenon and what constitutes the assemblages and how they were formed and currently held together. As a modern source document, this work is used extensively to gird the foundations of using the Actor Network Theory in military decision making using the String/ANT method.

Law, John, ‘Actor Network Theory and Material Semiotics’, version of 25 April 2007, (Lancaster University), <http://www.heterogeneities.net/publications/Law2007ANTandMaterialSemiotics.pdf>.

This unpublished paper explores the underpinnings of the Actor Network Theory and material semiotics as it has developed since first posited in the mid 1980s and early 1990s. This paper explains the actor network theory in its most mature stage. It will be drawn from to link the construct of systems and historical political development to the scope and complexity of given trans-national issues.

Steven Metz, “Counterinsurgency and American Strategy, Past and Future,” *World Politics Review*, 24 January 2012, <http://www.worldpoliticsreview.com/articles/11248/counterinsurgency-and-american-strategy-past-and-future>.

This article covers the aspects of misjudging the methods and forces to conduct counterinsurgency operations.

Morgan, Daniel, “Strategic Theory and the History of War”, in John Baylis, James Wirtz, Eliot Cohen, and Colin S. Gray (eds.) *Strategy in the Contemporary World*. New York: Oxford University Press Inc., 2002.

This essay is written to take measure on the development of strategic theory from the seventeenth century through the world war era and in to modern times. Thoughtfully drawing from all of the major classical theorists, the work consolidates major themes and concepts for existing ideas on war, governmental, and general trans-national social interaction.

Bradley Peniston, “Work: ‘The Age of Everything is the Era of Grand Strategy.’ *Defenseone.com*, 2 November 2015, <http://www.defenseone.com/management/2015/11/work-age-everything-era-grand-strategy/123335/>.

This article reports Robert O. Work, the United States Deputy Secretary of Defense, discussing the delicate nature of stewarding national resources amidst an alarming increase in global contingencies

Celestino Perez Jr, "Strategic Discontent, Political Literacy, and Professional Military Education," [thestrategybrigade.com](http://www.thestrategybridge.com/the-bridge/2016/1/7/strategic-discontent-political-literacy-and-professional-military-education), 14 January 2016, <http://www.thestrategybridge.com/the-bridge/2016/1/7/strategic-discontent-political-literacy-and-professional-military-education>.

This article discusses the basis of modern military professional education and its potential shortcomings in separating political and military factors.

Gao, Ping. 2005. "Using Actor-Network Theory to Analyse Strategy Formulation." *Information Systems Journal* 15 (3): 255-275. doi:10.1111/j.1365-2575.2005.00197.x.

Using the Actor-Network, this article explores the socio-technical construction of China's strategy for the telecommunications market, while making comparison to using the theory for developing a national strategy.

Osinga, Frans, 'On Boyd, Bin Laden, and Fourth Generation Warfare as String Theory', from *On New Wars* edited by John Olson, 2007.
http://www.au.af.mil/au/awc/awcgate/boyd/osinga_4gw_boyd_copyright2007.pdf.

This treatment focusing on the debate surrounding "fourth generation warfare" discusses the positive advances and shortcomings of the concept. The work also covers a general overview of requirement for the postulation of strategic theory as offered by several major works in the field of study. It is most relevant to the String/ANT theory to both positively test the theory and make clear distinctions from existing theories on modern grand strategy.

Patricia Schwarz, Ph. D., "The Official String Theory Website," Accessed on 31 December 2015, <http://www.superstringtheory.com/experm/exper5.html>.

An online resource describing string theory various aspect of string theory.

Symanski, Michael MajGen (USA Ret.), "War is Extinct, and We Miss It! Part 1: What Happened to War". ciceromagazine.com, December 2015, http://ciceromagazine.com/opinion/war-is-extinct-and-we-miss-it-part-1-what-happened-to-war/#_edn1.

This article discusses the changing character of war in the modern era. The author presents a most useful definition of "persistent conflict" that serves as a chief point within the argument of force structure design.

Patrick Tucker, "Einstein's Gravitational Waves Confirmed," [defenseone.com](http://www.defenseone.com), 11 February 2016, <http://www.defenseone.com/technology/2016/02/einsteins-gravitational-waves-confirmed/125874/>.

Article hosted by Defense One discussing the confirmation of Albert Einstein's prediction of gravitational waves within the Theory of General Relativity.

Vaughn, Michael, 'After Westphalia, Whither the Nation State, its People and its Governmental Institutions?', Paper presented at The International Studies Association Asia-Pacific Regional Conference, 29 September 2011. <https://espace.library.uq.edu.au/view/UQ:266787/AfterWestphalia.pdf>.

This paper examines the decline of nation-state rule and its implications for the resultant, changed international order and populations most directly affected. It concludes that the post-Westphalian state system will have a variety of potential forms and manifestations and that new political institutions and practices are needed to enable the world's people to cope with altered international society and to govern their own, increasingly interdependent, affairs. This work is central in understanding decision-making and solution design to nation-state based political and military leaders dealing with myriad trans-national actors in the form of non-governmental organizations and corporations.

Edward J. Villacres and Christopher Bassford, "Reclaiming the Clausewitzian Trinity," strategicstudiesinstitute.army.mil, originally in *Parameters* Autumn 1995, <http://strategicstudiesinstitute.army.mil/pubs/parameters/articles/1995/1995%20villacres%20and%20bassford.pdf>.

This article discusses what Clausewitz's "remarkable trinity" was meant to represent. The major points of this article will serve to reinforce the Prussian military theorist's intent while using variations of the model to relate to modern circumstances in a representation of human decision-making.

Barry D. Watts, "Clausewitzian Friction and Future War (Revised Edition)," *Institute for National Strategic Studies, National Defense University, McNair Paper 68*, (2004).

This paper is focused on the Clausewitzian concept of friction and the factors it plays on the battlefield and modern decision-making. Throughout the author's argument, it becomes increasingly apparent that his methods parallel the use of other sciences as a model to base his conclusions. This paper serves as a reinforcing theme to applying concepts from other sciences as well as the idea that friction as discussed is parallel to dissonance in harmony for strings.

Michelle Yan, "Top Army General Outlines Plans for New Brigades, New Technologies," *Armytimes.com*, 21 January 2016, <http://www.armytimes.com/story/military/pentagon/2016/01/21/army-chief-outlines-plans-new-brigades-new-technologies/79129834/>.

The author of this article outlines US Army plans that seek to create standing "train and assist brigades" while using updated technologies. It is informative of service component initiatives to specialize some units to conduct steady state activities to preserve force structure designed for conventional warfare.

