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A Non-Linear Interpretation of Clausewitz and Intelligence

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Introduction

Carl von Clausewitz's remarkable grasp of the fundamental aspects of war have stood the test of time. Clausewitz remains relevant in the post-modern era despite advances in technology, precision weapons, communication architectures and computers--developments which have rendered other theorists passe. His writings provide a bedrock of understanding on which to overlay current capabilities and conceptual frameworks. The freshness and relevance of Clausewitz's insights stem in large part from the non-linearity of his cognitive approach. Alan Beyerchen makes a most persuasive case that Clausewitz was a non-linear thinker, whose work is best approached from the perspective of the relative y new non-linear sciences.[1] This paper investigates how Clausewitz's classic work "On War" addresses the issue of intelligence, explores the value of understanding the importance of non-linearity in fully comprehending his thought processes, and posits some implications for the Intelligence Community

Exploring Non-Linearity

Clausewitz's view of war was decidedly non-linear. He embraced themes and provided examples that are core to the non-linear "new sciences" which, for the past 30 years, have been creating a new scientific paradigm replacing the Newtonian linear construc. These sciences include complexity and Chaos theory, which are characterized by the interdependence of elements, complexity of systems and non-predictability. Reading Clausewitz with a backdrop of the post-modern, non-linear approach adds a richness and depth to his thought--it is as if the reader experiences the "clicking on" of a light bulb. He exhibited a post-modern spirit in his effort to "totalize chaos"[2] but lacked the modern taxonomy and conceptual tools. He thus lacked the terminology and cognitive constructs with which to clearly express himself, which

[1]Beyerchen, Alan, "Clausewitz, Nonlinearity, and the Unpredictability of War," International Security. Winter 1192-93 p 59-90
[2]Veith, Gene Edward, "From the Modern to the Postmodern", Postmodern Times, 1994, p 42

goes far in explaining his contradictory and often almost painful writing--as he argues with himself, trapped in a linear construct, yet knowing there is "something more" out there

What is Linearity?

Briefly, the Newtonian linear approach assumes that there is proportion in a system, that cause and effect are proportionate to each other Thus, a small action will create a small reaction It also assumes that all elements in the system add up, that the whole is the sum total of all its parts This permits a reductionist methodology to understanding systems for the whole can be reduced to multiple parts, and each examined separately A linear system is characterized by predictability, for if one knows the inputs then one knows the outputs The military theorist Jomini, for example, used a linear approach in his prescriptive use of interior and exterior lines Thus, central themes of linearity are causality, determinism and reductionism [3]

This approach is, of course, valid in those cases where systems exhibit linear attributes which allow them to be decomposed into sub-compartments, such as an algebraic equation Science, however, because it had a linear "hammer" perceived the universe as a linear "nail" when in actuality linear systems comprise only a small percent of universal systems Heretofore, this approach was applied to all systems because it was the only tool available Where the application did not fit, the problem was either simplified until it fit the paradigm, ignored, or deemed "uncontrollable" and "unexplainable," like the weather Post-modern tools, primarily the computer, have permitted scientists to explore the vast phenomena in all fields of endeavor, such as biology, physics, economics, chemistry, social sciences, that cannot be explained with linear concepts Many people, like Clausewitz, instinctively knew that the linear approach was inadequate in explaining the workings of the world He stated that "in short, absolute, so called mathematical factors never find a firm basis in military calculations" , referring to the inadequacy of a linear approach to explain the problem at hand [4] Non-linearity has now been

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[3]Merry, Uri. Coping with Uncertainty, chapters 1-9
[4]Clausewitz. On War, p 86

documented and scientifically validated with the aid of super-computers and their capability to "solve" and graphically depict non-linear problems

Non-Linearity

Non-linear systems are just that--they are not linear. They are not proportional and they do not neatly add up. They instead are composed of synergistic interactions of many elements where the whole is not necessarily the sum of its parts. Two sciences which emerge from the non-linear paradigm are complexity and Chaos theory (a capital "C" is used to distinguish it from the noun that, while descriptive, does not capture the entire concept). Complexity and Chaos are scientific applications as well as states of existence on a continuum that progresses from stasis, through steady state, to complexity, and, finally to Chaos. This continuum is similar to a decision tree. Stasis, or equilibrium, exists at the far left of the tree where few choices, or bifurcation points, exist, systems are defunct in this area. The system then progresses through a steady state to complexity, where there are four to eight bifurcation points, or four to eight possible solutions to any given problem. These are optimal futures, not "optimum" implying the best, but "optimal" in that they are valid options [5]

Scientists opine that the best place for a system to exist is in this range of complexity, on the edge of Chaos, where the system is most alive and dynamic. Finally, crossing the 16th bifurcation point on the far right of the tree we enter Chaos, where the system becomes chaotic and bifurcation points can no longer be identified [6] Clausewitz stated that "the multiplicity of forms that combat assumes leads us in as many different directions as are created by the multiplicity of aims," reflecting the bifurcations possible in pursuing conflict [7] He further demonstrated an understanding of a system's sensitivity to initial conditions, when he wrote that "success is not due simply to general causes. Particular factors can often be decisive--details

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[5]Beyerchen, p 59-65
[6]Merry, chapter 7
[7]Clausewitz, p 96

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only known to those who were on the spot   issues can be decided by chances and incidents so minute as to figure in histories simply as anecdotes "[8]

While non-linear systems are uniquely different from each other, like wars are different from each other, they do share common characteristics

1) connectivity, everything is linked to everything else,

2) interdependence how one thing changes affects other things and how they may change,

3) non-predictability, because input does not add up to output

Also, they share the concept of emergence, where patterns or trends emerge from the whole   On the surface this seems contradictory, for if the system is unpredictable how can patterns be detected? This emergence of patterns occurs because of the feedback mechanism--the system as a whole continually adjusts to the inputs it receives   In a sense it "learns"   These patterns can be discerned only at very coarse granularity, one has to focus on the forest, overtime, and not on the trees   It is not possible to predict what may happen to individual trees or to the pattern at any particular point   But, the patterns of activity that arise from the system as a whole--the forest--can be identified and studied, not as much to try to predict how it may manifest next, but in order to determine what small change or adjustment might be made in the system to affect an outcome [9] Clausewitz grasped the phenomena of emergence when he said that "the mass of combatants in an army endlessly form fresh elements, which themselves are part of a greater structure "[10]

With an understanding of the system's feedback loops an observer could plot what reactions the system makes in reaction to changes, thus learning to manipulate the outcome Because these systems are dynamic, constantly adapting, self-organizing and sensitive to very small initial changes it is possible to propel them into widely different directions by varying the initial stimulus only marginally

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[8]Ibid , p 595
[9]Merry, chapter 7
[10]Clausewitz, p 96

The effects of emergence have been documented in the physical sciences and recently in economics, and while more work in the social sciences is required, scientists believe it holds value in studying human dynamics It requires more study but holds great potential for analyzing practical situations

Understanding complexity and Chaos theory may provide a commander with a tool that 1) helps him to prepare for and manage uncertainty, which is the norm and not an unusual state, 2) helps him discern emerging patterns in the events around him. and 3) provides hope that he can manipulate the situation--not control it. for that is a theoretical impossibility. but shape events toward his objective Thus, the right action on his part, at the right time, can significantly affect his own forces, the enemy's, and or the environment, to ensure operational success

The Realm of Uncertainty

Clausewitz perceived uncertainty to be a pervasive problem that a skilled commander had to deal with successfully in order to be victorious on the field of battle He states that "war is the realm of uncertainty. three quarters of the factors which action in war is based are wrapped in a fog of greater or lesser uncertainty " [1] It is also the realm of chance. for "chance makes everything more uncertain and interferes with the whole course of events " [12] An examination of this state of "uncertainty" is useful Webster's Dictionary defines uncertainty as " the condition of being in doubt, lack of certainty " "Certainty " is defined as "the state of being certain," and further states that it is synonymous with assurance and conviction Uncertainty then is not ignorance, per se, (though ignorance is a contributing element). an "unknowingness" that could be remedied by the simple accumulation of facts It is an amphorous state of existence. this fog consists of many parts and is not easily pierced Ultimately, the commander is seeking an understanding of his situation and an assurance that his course of action is correct

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[11] Ibid , p 101
[12] Ibid p 101

at that particular point in time--that it has the impact he intends, and that he knows how to deal with that impact

The fog of uncertainty restricts the commander's vision, blurring his options, and trapping him in a twilight zone where reality must be unmasked   The commander can take some comfort in his predicament, for he is not alone, the fog of uncertainty shrouds not only himself but also envelopes all the players on the field, including the enemy   If this state of uncertainty were not bad enough. Clausewitz introduces an accompanying phenomenon--friction--to interact with the fog   Clausewitz. as a student of the most current sciences of his day, used an analogy that is easily understood today   Friction in war is like friction in an engine. it causes things to rub against each other, and without a lubricant, bear metal scrapes bear metal until the engine, working more and more laboriously, finally freezes   So in war, Clausewitz perceived friction as slowing things down, making the easy difficult and if unchecked. causing all movement to stop   This state is complexity and Chaos theory's state of stasis on the far left of the tree described earlier, it is a moribund state in which the commander has no options

Clausewitz struggles to offer the commander a means to escape his predicament   Efforts to lessen uncertainty can focus on either the information component--increasing the commander's understanding--or on the human component--improving the ability of the commander to make good decisions despite his uncertainty [13]   Based on the resources of his time, Clausewitz focused on the second avenue of approach   It is the military "genius" of the commander that can cut through the fog and friction of war, and Clausewitz urges that he develop his intellect, temperament and coup d'oeil--the ability to find the truth--for these attributes are his only hope   Today, technological advances and the professionalization of intelligence have permitted the exploitation of the first approach, which addresses the steadily increasing information component of war

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[13]Schmitt, John. "Fighting in the Fog Dealing with Battlefield Uncertainty". p 64-66

Intelligence

Clausewitz acknowledges the critical importance of intelligence, calling for "every sort of information about the enemy and his country--the basis of our own plans and operations " [14] Further reading. however, indicates that he never met any intelligence he liked Granted, collection was not particularly sophisticated in his day, but information gathering techniques were employed throughout military campaigns, and they certainly provided the commander with some data What, then, was the problem? Clausewitz is obviously frustrated by the fundamental nature of information, it,too, is enveloped in the same fog it hopes to clear, for even when collected and processed information can appear contradictory and confusing He complains that ' this difficulty of *accurate recognition* constitutes one of the most serious sources of friction in war. by making things appear entirely different from what one had expected "[15] Several important issues are interwoven, issues which remain relevant today

1 The concern with the source of the information, whether the source is truthful and had access to the information The concept of reliability, sources and methods is raised

2 The concern that the information is a depiction of reality that the truthful source was not duped by the enemy to honestly report a falsehood , or that it represents the truth of the moment, but that the moment has passed and a new truth has emerged The concept of validity is raised along with concerns about and deception and timeliness

3 The concern that the commander's perception of the situation--his preconceived notions, prejudices, preferences--may determine how he interprets the information he receives The issue of understanding is raised here This concern underlies Clausewitz's insistence on the need for the commander to develop "a standard of judgment" in order to be able to sort, gauge and use the information he receives [16]

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[14]Clausewitz, p 117
[15]Ibid.. p 117
[16]Ibid , p 117

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The overarching issue is information assurance--can it be trusted? Intelligence attributes include source reliability and access, timeliness, accuracy, applicability, and format   While these concerns were particularly acute for Clausewitz, who relied on human beings for information, his insight grasps the fundamental nature of information and is not merely a commentary on the particular collection source or its quality   Clausewitz has identified the non-linear nature of intelligence and unveiled basic concerns that the Intelligence Community constantly grapples with today

The Challenge for Intelligence

Understanding Clausewitz as a non-linear thinker deepens the implications of his comparison of war to a duel between wrestlers and the dilemma the analogy presents to the intelligence officer   The wrestlers are each living forms creating a new form in their interaction as they are in the process of continually "becoming" something else, they are subject to the dynamics and unpredictable of complexity theory as they exhibit the phenomena of emergence   Intelligence must characterize the ensuing actions on a physical, emotional and planning level and plot the unfolding events step by step   The task is complex , for it must characterize what these wrestlers do individually, their actions in response to one another, the match as a separate study. "he influence of the environment on the match and vice versa, how the wrestlers feel physically and emotionally, their stamina, what they are thinking, what they might have done and may do in their next move, what move they may have yielded to the opponent to gain a strategic edge, all this--and more--continuously over the length of the match The initial tendency to dismiss Clausewitz's frustration with intelligence as simply a reflection of a lack of technical capabilities that can now solve the problem is thus dampened as the magnitude of the problem is revealed   While there are new ways of addressing it, the inherent complexity of securing reliable intelligence is as real today as when Clausewitz outlined it [17]

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[17]Beyerchen. p 63

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Implications

Clausewitz describes war as a non-linear event which can be managed successfully only by the develop of a military "genius" who combines judgment, intuition, common-sense. and coup d'oeil with experience Similarly, intelligence as a non-linear activity also requires the development of a comparable "genius" who has the skills and experience to discern the truth amid uncertainty The attributes Clausewitz extols as "genius" apply equally well to both the operational and intelligence fields The Intelligence Community should strive to create its own genius to deal with the fog and friction that exist in the increasingly complex information sphere The Community has expended considerable resources at lessening uncertainty through improving the information component of the equation, it may be appropriate to focus more now on developing a cadre to deal with the human component of the equation There is a need for an intelligence "genius" to help the commander counter the effects of uncertainty through understanding And, as the prospects for information warfare emerge, the prospect of conflict that faces the military genius on the field of combat may one day face the intelligence "genius" in the information sphere

The intelligence "genius" would develop traits similar to those desired by Clausewitz in the commander Such a genius is exemplified by the young Dr Ryan in the novel "The Hunt for Red October" Ryan possessed the same data as others, yet because of his experience and intuition he hit upon a totally divergent point of understanding--one which took courage to articulate and act upon, and which lead to a series of potential actions

There are many areas where the intelligence genius can apply an understanding of Clausewitz and the non-linear sciences to reinvigorate an examination of import to intelligence and ultimately the commander The following are areas worthy of examination

Uncertainty The intelligence officer must recognize that an accumulation of real-time data does not create certainty While appreciating the timely and encompassing data produced by interpretable architectures and sensors that provide dominant battlefield awareness he must also

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recognize its limits Following the theory of complexity, true knowledge and understanding are more than the sum of the data that is input They are the products of human experience and intuition Absolute certainty is a chimera, it is not attainable Therefore, the intelligence officer must accept and embrace uncertainty

Nature of information Information is not linear, it is fuzzy: it does not possess the same value or importance consistently For example, the same stimulus to the wrestlers in our earlier analogy will have varying results--provide different feedback, or information--depending on circumstances (they are in pain, tired or have a head-lock on the opponent) Information exhibits properties of emergence, thus, although it may look the same, it may mean something completely different.

The information environment The information medium is flooded, most information is insignificant to the commander The plethora of cyberjunk and information overload creates fog and friction for the intelligence officer He must be wise enough to differentiate, to identify the critical information at the right time and place

Limitations of collection Not all data is accessible For example, if emitters are not operational, it is not possible to detect any signals Also, much of what is key to the commander is a mystery--that is, it does not exist to be collected For example, the adversary may not know what he is going to do next, and so this information is a "mystery," it does not yet exist and cannot be collected Each collection discipline has its strengths and weaknesses, and it is crucial for the intelligence officer to orchestrate his efforts accordingly

Technology Sophisticated, often compartmentalized collection assets, systems and inter-related processing systems create opportunities for acquiring more information, while simultaneously creating friction by complicating choices, inputs and sources Multiple sources of information exist at every level, from tactical and theater to national and global Maximizing the use of this technology--to avoid redundancy at the expense of necessary information-- is difficult Further, technology should not drive requirements Because data is collectable does not mean it should be collected Advances in the human source capabilities have been

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minuscule since Clausewitz wrote, yet they remain the most difficult, yet lucrative, collection discipline. Emphasis must be placed where the need is greatest, not where immediate rewards are most forthcoming. Increasingly complex technologies offer new vulnerabilities to disruption or deception, and may, following complexity theory, develop unintended characteristics

Commanders information needs. The intelligence officer must understand that the commander's information needs are not data intensive, but rather highly variable and human-intensive. How a commander interprets and assimilates information reflects his experiential and personnel preference base. Learning how he perceives, how the staff perceives and how information is shared between them is an important dynamic in determining how to "package" information for maximum utility. In addition, differences in decision-making styles will influence the quantity, quality and format of information. Analytic reductionism does not maximize non-linear dynamics, for it may miss the big picture by focusing on the trees

History. As Clausewitz suggested the military officer study past campaigns, so too should the intelligence officer study intelligence history. For example, the pathologies of information in Vietnam produced by a system that was too complex and centralized to be used, and which spawned alternative compensating "underground" channels must be reflected upon in light of today's complex systems [18] The methodology employed throughout the intelligence cycle must be effective in practice as well as in theory

Command and Control " The aim of command and control is to reduce the amount of uncertainty that commanders must deal with so they can make sound decisions", and is inexorably interwoven with the intelligence function [19] The methodologies of intelligence and command and control must complement each other to lessen the anxiety uncertainty creates and ensure optimal options are presented for sound decision-making. The intelligence officer must understand the importance of the feedback loops command and control provide, for these provide the commander with a flow of information on the unfolding situation, and how

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[18] van Creveld, Martin, Command in War, p 258-260
[19] Marine Corps Concept Paper, p 69

subordinates initiatives changed it, allowing for adjustment Command and control operates as a hierarchically organized web of information sources, and complexity theory would suggest they works best at lowest command levels in a decentralized manner The Marine Corps concept of command by influence recognizes and harnesses the non-linear dynamics that are occurring to ensure the force can continuously change to changing requirements

Threats The revolution in military affairs places a great reliance on the availability of information, the interconnectedness of systems, near-real-time sensor data and the full exploitation of the technologies capabilities Budget constraints and a drive for efficiency have in some cases limited redundancies of systems and processes Adversaries will likely target this reliance as a decisive point for disruption or attack If conducted overtly there may be few alternatives for operation, if done covertly--to tamper or alter information--it can lead to an information assurance crisis The intelligence officer must be aware of defense capability, the threat and plan how to operate without the systems he relies upon

Develop options All the information in the world and perfect battle space awareness will be of no use if no viable options for action exist The intelligence officer must work closely with the commander to develop a strategy that maximizes optimal options. that allows for operation at the edge of chaos

Modeling and simulation Conducting modeling and simulation and wargaming exercises is an integral element in developing attributes of the intelligence genius Low level models, instead of the current high-level model approach, would better address the dynamics of Chaos and complexity by focusing on the forest and emerging patterns and permitting parametric changes in initial conditions to investigate how to manipulate final outcomes

Non-linearity A working knowledge of complexity and Chaos theory is essential for the intelligence officer Understanding the cause of unintended consequences. being mindful of the emergence phenomenon, and being cognizant of the attributes of these non-linear sciences will help the intelligence officer deal effectively with the non-linear world and events in it

Information is a cornerstone of warfare, for the commander's decisions often pivot upon it. An understanding of complexity and Chaos theory provides a framework for a realistic appraisal of the intelligence challenge. While information dominance is a commendable goal for which to strive, the undercurrents of complexity, coupled with Clausewitz's fog and friction, will render it illusive. A true modern revolution in military affairs must involve more than a paradigmatic shift in weapons doctrine and organization. It must be accompanied by a simultaneous shift in the scientific paradigm, from linearity to non-linearity, to provide a revolutionary framework of reality for future military endeavors. Only by incorporating this scientific paradigm in its thinking can the defense community hope to uncover "glimmerings of the inner light which leads to truth."[20]

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[20]Clausewitz, p. 132.

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