CENTER OF GRAVITY: THE SOURCE OF OPERATIONAL AMBIGUITY AND LINEAR THINKING IN THE AGE OF COMPLEXITY

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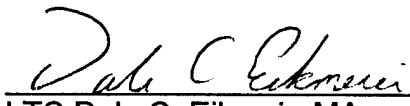

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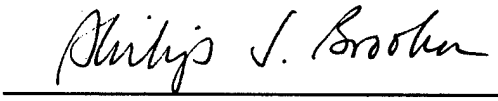

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ABSTRACT

THE LINEAR BASED CENTER OF GRAVITY: The Antithesis to a Systems Approach to Warfare by MAJ Darfus L. Johnson, USA, 47 pages.

This monograph examines the question is Clausewitz' theoretical concept of center of gravity the antithesis of a systems approach to warfare. The nature of conflict has changed since the age of Clausewitz, and a theoretical concept designed to explain war in the Napoleonic era may not be applicable to warfare in the present and future.

The monograph examines the theoretical origins of the concept in the context of Clausewitz' time. It examines the string of reasoning that may have led Clausewitz to his postulations on the concept of center of gravity, and why an almost literal translation from Clausewitz' era until the present continues to perpetuate the linear nature of the concept. Modern systems theory rich with applicability to warfare in the information age is contrasted against the linear based Clausewitzian concept.

The monograph explains the role of the concept relative to systems shock and reveals how operational planners confuse the issue by mixing concepts creating a doctrinal soup of terms centered around the linear based concept of center of gravity.

The monograph concludes with recommendations that if accepted would actually develop concepts that reflect how U.S. forces fight. It would incorporate a new systems based concept of center of gravity as an inductive process; conditions that operational planners and systems thinkers seek to induce into a rival system causing System Shock. This would be counter to the deductive concept currently used and would foster a common understanding among joint forces where none currently exists.

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CHAPTER I

INTRODUCTION

The concept of center of gravity fills an important position in current Joint and army doctrine. It is arguably the key concept in linking all elements of the operational art. Although generally acknowledged by planners as the glue of operational art, it actually has a disjunctive effect in application. Many military professionals attribute this "disjunctive effect," to the proliferation of doctrinal concepts, and multiple centers of gravity at all levels of war. Other professionals believe that the concept is just not valid for non-linear contemporary conflict. This paper argues that this "disjunctive effect" occurs because the current doctrinal use of center of gravity is linear based, and thus the antithesis of a systems approach.

This paper discusses the original theoretical concept of center of gravity, and why in application it invariably leads to linear thought processes that are actually counter to the way U.S. forces fight. This paper is not intended to establish the validity of the concept, that issue has been covered in countless monographs, articles, books, and is essentially moot.

The purpose here is to examine how the current doctrinal use of the concept confines planners to executing a process that is not effective in dealing with the increasing complexity of present and future conflict.

Chapter II, of this paper discusses the theoretical origins of the center of gravity concept in the Napoleonic, era of large decisive battles. It reveals the concepts evolution from a prescriptive force on force focus in Clausewitz's early writings to the more abstract descriptive usage later in his Book Eight of ON WAR.

Chapter III, is a discussion on linear and nonlinear warfare. The discussion of linear warfare focuses on establishing a conceptual framework that compares the current doctrinal use of the concept of center of gravity to its origins and how it invariably leads to services thinking one dimensionally. John B. Saxman in his monograph on the utility of center of gravity gives a possible explanation for this almost reflexive one dimensional thought process, he says:

> A likely explanation for the problem in defining centers of gravity is that the services tend to identify as enemy centers of gravity only those things that are within their sphere of influence and directly affect their mission accomplishment.[1]

The Chapter's discussion on nonlinear warfare focuses on multi-dimensional, distributed operations. It reveals how the complexity of operations defy, the linear logic inherent in the current use of the concept of center of gravity. An excerpt from FM 100-5 demonstrates how doctrine writers in tacit acknowledgement of this complexity, mix elements of systems theory with the concept of center of gravity creating confusion.

In Chapter IV the criteria used to evaluate the thesis statement aa are at the heart of the relationship between the concept as theory, the concept as doctrine, and its role as the glue of operational art. In other words as one of the few doctrinal concepts common to all the services, it should be a point of understanding for operational planners. The concept should assist planners in linking the military capabilities unique to the respective services, into coherent plans to achieve operational and strategic objectives.

To be useful the concept must be more effective than a systems approach in focusing resources. It must promise conflict termination on terms favorable to the U.S., at a practical cost in men and material. The center of gravity

concept must be applicable to a broad range of engagement options involving operations from peace to war. To maintain is current doctrinal importance, the concept of center of gravity, must provide clarity at all levels, linking ends ways and means in pursuit of strategic success.

Chapter V, the analysis discusses the concept of center of gravity in relationship to a systems approach. The chapter establishes why the linear based center of gravity is the antithesis of a systems approach by comparing the concept to systems thinking, operational/ systems shock, and the complexity of engagement in the information age.

The section on systems thinking discusses the importance of viewing an opponent from a systems perspective. This is counter to the current reductionist method used in identifying centers of gravity. This method reduces an adversary's system to its component parts in order to identify sources of power and strength vulnerable to attack. This section argues how the "paradoxical logic" of assuming vulnerability in an opponent's strength, alone argues for another approach.

The section on operational/ systems shock argues that the mix of concepts, and individual service capabilities leads to U.S. planners actually taking a systems approach to

operations. However, planners confuse the issue by trying to apply the linear based concept of center of gravity. To underline, this argument a discussion of U.S operations in Desert Storm supports both the utility of taking a systems approach, and how this approach makes the process of identifying centers of gravity for attack irrelevant.

The final section on the role of center of gravity in the information age discusses how U.S. planners, limit options by attempting to impose order through concepts. The discussion on present and future engagement argues for a paradigm shift that frees planners from a predictable deductive process of identifying centers of gravity. The new systems paradigm advocates the concept of planners thinking in terms of "whole entities," instead of component parts when developing campaign and operational plans, seeking opportunities to induce the desired conditions into a rival system.

The conclusion discusses the implications for Joint and Army doctrine of a new paradigm, centered on a systems approach. The new paradigm far from eliminating the concept of center of gravity from the doctrinal lexicon will give the concept renewed relevance within the systems framework. The concept of center of gravity within this framework could

bring a whole new level of coherence to the operational art, creating a common doctrinal concept for all services.

CHAPTER II

2.1 CENTER OF GRAVITY IN CONTEXT

The first step in understanding the role that the concept of center of gravity plays in our current operational thought, is a review of the concept in context at it's inception.

The problem here is common to anything reviewed through the prism of time; there is a tendency to place a revisionist spin on past occurrences in order to make them fit current notions. In other words if you are already a proponent of the importance of center of gravity, then each historical instance of conflict will be judged by your perspective; (success or failure as a product of identification and nullification of the opposing force center of gravity) without a truly objective holistic approach to causality.

The author must confess to the same tendency to revise historical outcome to justify preconceived notions of the

concepts validity; however in the main a true and objective outlook is maintained.

2.2 THE NATURE OF THEORY

> It is easier to use theory to organize, plan, and conduct an engagement than it is to use it in determining the engagements purpose.[2]
>
> Clausewitz

The role of theory in shaping doctrine has been much discussed, is theory prescriptive or descriptive, or does it matter as long as it provides a frame of reference for us to relate occurrences in war to some identifiable pattern. Dr Richard Swain of the United States Command and General Staff College, gives an example where theory is a logical progression from ideas to doctrine, he states:

> Ideas are important. Born or adopted in particular historical circumstances, they influence behavior. Ideas are joined to form concepts and concepts are merged to form systems intended to achieve particular purposes. In military organizations, when such systems are unified institutional theories of war fighting, they are called doctrine.[3]
>
> Swain

The concept of center of gravity is an idea expanded far beyond its simple physical origins, to its present position as the essential concept of operational art.

Moreover, in the expansion it has ceased to be theory and become doctrine, merged with other supporting concepts it provides an illusion of coherence to actions taken to achieve operational decision.

It is important to note Clausewitz,' caution to those who have misplaced confidence in a particular theory. "Theory exists so that one does not have to start afresh every time sorting out the raw material and ploughing through it, but will find it ready to hand and in good order.' It is meant to educate the mind of the future commander, or, more accurately, to guide him in his self-education; not accompany him to the battlefield."[4] In using the linear based Clausewitzian concept of center of gravity planners limit the wide range of options available to deal with conflict to ones that fit the concept.

2.3 ORIGINS OF CENTER OF GRAVITY

The origin of the theoretical concept of center of gravity is found in Clausewitz,' ON WAR; it appears several times in various parts of the book to explain the focus of military effort and resources. Clausewitz,' use of the concept can be applied to actions taken to achieve decision at either the tactical or the strategic levels of war. This

is a particularly important point, since the theory is so flexible it appears to have relevance well beyond the period for which it was conceived.

To establish the framework for a discussion on the center of gravity concept, it is necessary to take the entire string of reasoning behind Clausewitz' development of the concept. The concept first appears in a discussion on defense of a theater of operations in Book Six, Chapter 27, in ON WAR.[5]

> A center of gravity is always found where the mass is concentrated most densely. It presents the most effective target for a blow; furthermore, the heaviest blow is that struck by the center of gravity.[6]
>
> Clausewitz

This is obviously a reference to the physical nature of center of gravity, a view of center of gravity as a concept of mass, concentration, and movement. Clausewitz transfers this physical analogy to the conduct of war, when he states:

> The same holds true in war, the fighting forces of each belligerent--whether a single state or an alliance of states--have a certain unity and therefore some cohesion. Where there is cohesion, the analogy of the center of gravity can be applied. Thus, these forces will possess certain centers of gravity, which, by their movement and direction, govern the rest; and those centers of gravity will

be found wherever the forces are most concentrated.[7]

The continued association of the concept with the massing of forces to focus effort at a decisive point provides the foundation for the unavoidable linear nature of the concept. In theory the convergence of these forces, this concentrated mass, would meet in a single violent pulse of combat that would prove decisive:

> The major battle is therefore to be regarded as concentrated war, as the center of gravity of the entire conflict or campaign. Just as the focal point of a concave mirror causes the sun's rays to converge into a perfect image and heats them to maximum intensity, so all forces and circumstances of war are united and compressed to maximum effectiveness in the major battle.[8]
>
> Clausewitz

The prescriptive nature of this statement and the correlation of mass, concentration and decisive point, creates the impression that here is the answer to victory. There is also the implication that despite the uncertainty inherent in war; the astute general can be assured that action taken to destroy the enemy center of gravity (his fighting force) will have a predictable and positive effect.

In attempting to describe war, as he knew it Clausewitz, shifted from descriptive theory to prescriptive

principles that seemed to assure success in an uncertain business. Although his later thoughts on center of gravity were more abstract, Clausewitz still considered the major battle as the most significant factor in achieving decisive victory. He states:

> Still no matter what the central feature of the enemy's power may be --the point on which your efforts must converge-- the defeat and destruction of his fighting force remains the best way to begin, and in every case will be a very significant feature of the campaign.[9]

From the initial tactical implications on the nature and purpose of the center of gravity Clausewitz, goes on to expand the nature and purpose of center of gravity to encompass actions in abstract realms. He says:

> What the theorist has to say here is this: one must keep the dominant characteristics of both belligerents in mind. Out of these characteristics a certain center of gravity develops the hub of all power and movement, on which everything depends. That is the point against which all our energies should be directed.[10]

It is possible this excerpt reflects Clausewitz' further thinking on the subject; and a realization that in defining the center of gravity as a matter of forces, concentration, and mass there is greater certainty in war than actually exists.

In recognizing other levels of interaction beyond mass of forces, concentration, and movement present in achieving decisive victory, Clausewitz, expands the concept to allow for the influence of people's will, alliances, and leadership. However, a true Clausewitzian approach will have all three concentrated in the army. To Clausewitz the army and its actions were the physical manifestation of the peoples and governments will. This again is a matter of the perspective of war, as he knew it; a perspective influenced by the Napoleonic era's large mass armies searching for the single decisive battle. To Clausewitz, the will of the people, and the actions taken by the army to enforce that will, were inseparable from the desires of the commander.

Moreover, the path to destruction of the system was embodied in the individual or individuals that ruled. For instance, Napoleon's Grand Armee with which Clausewitz would have been familiar, was an extension of Napoleon's will. Although composed of and supported by the French people it could not accurately be portrayed as an extension of their will.

By whatever means Clausewitz arrived at this new paradigm for the concept of center of gravity, the theme

remains the same it is the most important target for a physical or psychological blow.

CHAPTER III

3.1 LINEAR and NON-LINEAR WARFARE

There is common acknowledgment that the nature of conflict in the information age argues against linear processes when conducting operations. Current Joint and Army doctrine focuses on establishing a theater framework to deal with the distributed nature of operations. One designed to effect an opponent throughout the depth and breadth of the theater of operations.

The analytical tool that provides the basis for planners to develop this theater framework is the linear based concept of center of gravity. However, using this linear based concept to impose coherence in today's complex non-linear environment is analogous to the Wright brothers attempting to fly a F15E. They would understand the concept of flight, but the complexity of the planes system's would be overwhelming.

In the insistence on applying the linear based concept to military actions, operational planners essentially become

the Wright brothers with that F15. Operational planners from all services understand the concept, but the complexity of operations frustrates all efforts to apply it. This inevitably leads to shaping conditions to fit doctrine, instead of the reverse, and continues to perpetuate the historically linear underpinnings of the concept. Roger Beaumont in War, History, and Chaos; says:

> The non-linear nature of modern conflict raises the Dilemma that using history to shape doctrine may widen the gap between the complexity of reality and doctrine, and create an inappropriate sense of order and generate rational expectations, by reducing perception of the actual angles that lie between contingencies and expectations. This is even more likely when doctrine is based on a single or very few historical cases, and on the perception of patterns and methods.[11]

In making the concept of center of gravity the connective tissue of U.S. operational art, planners are essentially using history to shape doctrine. And the "gap between reality and doctrine grows ever wider."

3.2 LINEAR WARFARE AND COG

> Given the nature of the subject, we must remind ourselves that it is simply not possible to construct a model for the art of war that can serve as a scaffolding on which the commander can rely for support at anytime. Whenever he has to fall back on his innate talent, he will find himself outside the model and in conflict with it; no matter how versatile the code, the situation will always lead to the consequences we have already alluded to: talent and genius operate outside the rules, and theory conflicts with practice.[12]
>
> Clausewitz

Although the idea of linear warfare has been discussed in previous chapters, it has not yet been defined. Webster's dictionary defines linear; as of, or pertaining to, or resembling a straight line. This naturally evokes an idea of what is commonly considered linear warfare, units side by side advancing or defending a front, or great lines of men all abreast, marching into combat. Another idea commonly associated with linear warfare is span of control. The commander could see the whole of his forces, and if not personally leading them into combat located himself where he could control their movement in battle.

However, linear warfare is as much a product of doctrine and concepts as the more commonly associated physical aspects. Thus, a conceptual way to view linear

warfare is as a sequence of related events occurring in one dimension, with all factors converging to create the decisive battle.[13] It is important to note here that what separates modern non-linear warfare from the linear form, is not just the dimensional expansion, but the expansion of concepts that support the physical aspects of war.

3.3 NON-LINEAR WARFARE

> Determining centers of gravity is a difficult process. It relies, to some extent, on guesswork. This is because a linear concept is applied to a non-linear activity.[14]
>
> Rowe

Having defined linear warfare, a definition of on-linear warfare is necessary in order to contrast and compare the usage of the concept in both eras. Non-linear warfare is complexity run rampant. The multi-dimensional conduct of operations, distributed throughout the depth of the enemy's formation calls, for minute synchronization of efforts and resources to achieve decision.

In this, multi-dimensional distributed environment the patterns of causality, cause and effect are often unpredictable and can act counter to intentions. Compounding the complexity of non-linear operations is the ambiguity inherent in modern unconventional or asymmetrical

operations. The level of uncertainty is exponentially increased with the expansion of information technologies and weaponry available to the highest bidder. The availability of technology has the potential to make even the most undeveloped country a force to be reckoned with.

Despite the recognition that this complex environment is non-linear. Planners still use the linear based concept of center of gravity, as the analytical tool to shape it. The following quote from Army FM 100-5 dated May 1986 is lengthy, but to shorten it would not convey the essentially linear nature of the concept.

> The concept of centers of gravity is key to all operational design. It derives from the fact that an armed combatant, whether a warring nation or alliance, an army in the field, or one of its subordinate formations, is a complex organism whose effective operation depends not merely on the performance of each of its component parts, but also on the smoothness with which these components interact and the reliability with which they implement the will of the commander. As with any complex organism, some components are more vital than others to the smooth and reliable operation of the whole. If these are damaged or destroyed, their loss unbalances the entire structure, producing a cascading deterioration in cohesion and effectiveness which may result in complete failure, and which will invariably leave the force vulnerable to further damage. The center of gravity of an armed force refers to those sources of strength or balance. It is that

> characteristic, capability, or locality from which the force derives its freedom of action, physical strength, or will to fight. Clausewitz defined it as "the hub of power and movement, on which everything depends." Its attack is- or should be-the focus of all operations.[15]

This excerpt demonstrates the confusing nature of the concept of center of gravity. The mix of systems theory and center of gravity is so vague that it is applicable to nothing. The last paragraph of this excerpt reveals the fundamentally linear nature of the concept of center of gravity. Its focus on single entities, i.e., a characteristic, a capability, a locality leads planners to think linearly searching for the single source of an opponent's power.

CHAPTER IV

Any discussion dealing with the value of center of gravity must address the importance of the concept, as the defining theory of operational art. The following criteria tests the usefulness of the concept by applying several essential components that should be in the realm of its intent:

1. Is the center of gravity a Strength or Weakness?
2. Does center of gravity focus resources?

3. What is center of gravity's role in conflict termination?
4. How does complexity fit into the center of gravity concept?
5. How does the concept of center of gravity link ways and means?

These criteria are the most relevant for a discussion of the concept, because they encompass a range of areas that operational planners understand when attempting to apply the concept to war and operations other than war. The concept must have flexibility. It must be applicable to a broad range of engagement options. The scope of the concept must be broad enough that it allows for the complexity of operations yet serves to focus efforts in a coherent manner.

Finally, the concept must have clarity, not just for one service but across services in order to serve as a tool in planning Joint operations. This may after all be the most important role of the concept, fostering a common understanding among the community of services where none presently exists.

4.1 STRENGTH OR WEAKNESS

> What, then, is the center of gravity in modern terms? The center of gravity is the greatest concentration of combat force. This is the hub of all power and movement.[16]
>
> Schneider and Izzo

One factor that acts counter to a common understanding of center of gravity is the discussion over whether it is a strength or exploitable weakness. The answer on the surface would appear to be obvious Clausewitz' more abstract theory placed the center of gravity at the heart of an opponent's strength; "The hub of all power and movement upon which everything depends."

The modern concept in the excerpt from the Schneider and Izzo article, Clausewitz' Elusive Center Of Gravity, places the center of gravity clearly in the realm of the physical forces, at least at the operational level. The problem is that in modern conflict the line between levels is blurred or non-existent. Actions taken at each level overlay and effect all others, and the source of an opponents strength will not depend on concentrations of force at any level.

Furthermore, by describing the center of gravity as the greatest concentration of combat force operational planners

perpetuate the process of operational planning and thinking along a linear path of reasoning. This linear path of reasoning causes confusion among professionals. Students of the operational art are confounded by the "paradoxical logic," of attempting to find weakness in an opponent's strength.

Perhaps systems theory provides a conceptual way to view the concept of center of gravity. Within the systems framework the concept of center(s) of gravity is not an opponent's strength or weakness in a physical sense, but "Nexus points," with redundant, self-supporting elements contributing to the systems functions. The actions taken to destroy these Nexus points will be physical, (force on force) and abstract.

This may seem a matter of semantics, but conceptually there is a great difference between "the hub," a center of activity from which everything else emanates; and "the nexus," a place of binding that all things flow into. The nexus has no inherent capability to project power, but serves as means of connection for a series or group of systems that with the connection become self-supporting.

The nexus is a systems concept that engenders a systems way of thinking, by forcing planners to think holistically

to determine contributing power group connections. Furthermore, this conceptual model can foster a seamless understanding between services, replacing the various definitions of center of gravity with a systems concept, focused on system vulnerabilities.

4.2 FOCUS OF RESOURCES

> In an era of diminishing resources, understanding operational art will be an invaluable asset to the decision-makers who will have to select which technological advances will be pursued and which will not.[17]
>
> Peterson

Despite the confusion that the center of gravity elicits when discussing strength and weakness, planners still seek to determine an opponent's center of gravity when pursuing military options. This process leads to dealing with the complexity and ambiguity of present operations in a linear target servicing way. "Where the enemy is treated as a mere array of targets, and success is obtained by the cumulative effect of superior firepower and material strength, eventually to destroy the full inventory of enemy targets."[18]

This after all has been the historical pattern of U.S. involvement in virtually every conflict this century,

victory through superior capability to produce and deliver mass quantities of goods and equipment. The sheer weight of stuffs often proving more decisive than tactical or operational strategy.

With today's constrained military budgets, this accumulation of superiority in stuff becomes more costly and less feasible. The emphasis will increasingly be on tailoring forces to meet objectives, by clearly defining the endstate, and determining the minimum of resources required in achieving it.

Consequently at the operational level, it is important to focus U.S. combat power and exploit only those vulnerabilities which best provide a means of achieving the desired endstate within this new more constrained environment.[19]

Within this environment, the linear based concept of center of gravity serves as a means to focus resources. This may be one of the reasons the concept is so compelling, because it assists decision-makers in determining where, and how, to act. The linear nature of the concept encourages a logical process of reasoning designed to accomplish the task at hand. Furthermore, planners in recognition of the increased complexity of present and future operations allow

for the existence of centers of gravity at each level of war that can shift overtime.

The concept of center of gravity as a means to focus available resources seems to be a valuable tool. The promise of order and coherence it provides is very compelling, but essentially proves to be mere "style over substance."

4.3 CONFLICT TERMINATION

> In war the result is never final, even the ultimate outcome of a war is not always to be regarded as final. The defeated state often considers the outcome merely as a transitory evil, for which a remedy may still be found in political conditions at some later date.[20]
>
> Clausewitz

The previous section discussed the importance of the concept of center of gravity in focusing resources in a resource-constrained environment. Another reason the concept is so compelling is its promise of conflict termination on terms favorable to the U.S. In theory if an opponent's center of gravity is destroyed his "hub of power," conflict termination will logically follow. The danger in using the concept of center of gravity in seeking conflict termination is in discounting the ability of a committed opponent to adapt. Clausewitz says:

> If a decision by fighting is the basis of all plans and operations, it follows that the enemy can frustrate everything through a successful battle. This occurs not only when the encounter affects an essential factor in our plans, but when any victory that is won is of sufficient scope. For every important victory-that is, destruction of opposing forces-reacts on all other possibilities. Like liquid, they will settle at a new level. [21]

The reality of present and future conflict suggests that there is no 'silver bullet," for ending conflict. Its very adaptability proves resilient to any application of force, often not ending but changing in nature and continuing on new levels. The U.S. mission in Somalia is an example of the changing and complex nature of operations. With the mission shift from humanitarian relief to force on force operations, the U.S. initial aim became distorted, resulting in a less than satisfactory ending to the U.S. involvement.

Perhaps an even better example of the complexity involved in military action is the ongoing operations in Iraq. The Iraqi regimes' resilience to sanctions and the use of force demonstrates the adaptability of complex systems. Although, the linear based concept of center of gravity promises conflict termination at a practical cost, planners

must expand perceptions to allow for the complex adaptive nature of a rival system, and the uncertainty in predicting conflict termination.

4.4 COG AND COMPLEXITY

The major reason that the concept of center of gravity is the antithesis to a systems approach to warfare is its limited ability to deal with complexity. The center of gravity as a vehicle to understand the patterns of behavior within an opponents system is inadequate. This stems from the very nature of the concept its focus on discerning strength or weakness not patterns of action and interaction of which power is just a manifestation.

Instead of the "rich set of spatial concepts we can use to understand patterns within the system, we rely on the mechanisms that seem to provide order to gain insight into the future."[22] In contrast to a systems approach that depends on recognizing the patterns underlying manifestations of power, in essence the systems that support other systems. The very linear nature of our concepts leads us to focus directly on the visible signs of power, this analogous to destroying the "tip of the iceberg," while ignoring the truly dangerous mass that supports it.

For example, the U.S. war in Vietnam was a study in complexity. All the elements that contributed to past U.S. victories were present, a vast superiority in material and equipment, the latest technology, and complete air and sea supremacy. This great mass of material and manpower committed to the conflict did not stave off U.S. defeat.

Revisionist history places much of the blame on the U.S. failing to identify and attack the strategic and operational centers of gravity, or failing to develop and articulate a coherent strategy acceptable to the American people. The argument has merit, but it ignores the fact that U.S. doctrine was not oriented on the operational level of war, and the concept of center of gravity was not a part of the U.S. doctrinal lexicon.

Even if it had been, the concept has no answer for the type of complexity inherent in a "Revolutionary War." A war likes the one in Vietnam where the enemy's power was not dependent on any one thing; but was a "Trinity," of the people, army and government. A series of systems within a system, mutually supporting and ultimately unbeatable, with linear logic, because "they are self organizing, progressive and evolving from states of lower to states of higher complexity."[23] The challenge in operating in this

environment is recognizing when concepts like the linear based center of gravity do not provide all the answers.

4.4 WAYS AND MEANS

Perhaps the continued relevance of the center of gravity lies in the fact that it seems "the only reliable guide through the 'fog of war' providing a tool for understanding the relationship between purpose and objective."[24] It orders operations in a manner so "that we can clearly say if we manage to do that and that, then we will get what we want, and the whole effort will have been worth it."[25] If operational art is pivotal to success in war, then the concept of center of gravity is "the essential link between tactical capabilities and strategic goals."[26]

In theory, it binds all the things, discussed so far into a vehicle useful for the operational commander in prosecuting the war. In determining the ways and means of engagement, translating the strategic goals into a useful operational strategy is critical. Currently operational planners use the linear based concept to help in this translation; it serves as a means to develop the options for engagement in a way those responsible for policy can understand.

However, in striving for clarity we revert to a pattern of reductionism, that fails to convey the complexity at play in whatever decisions we make, and how engagement even with the best intentions have a paradoxical effect. The reason of course is no matter how well crafted the strategy whether, operational or strategic, results of action will continue to defy logic.

In fact, because of the random complexity involved in even minor decisions, the linear logic associated with the current concept is replaced by what Luttwak calls a "paradoxical logic" he says:

> The entire realm of strategy is pervaded by a paradoxical logic of its own... It often violates ordinary linear logic by inducing the coming together and even the reversal of opposites, and it therefore, incidentally, tends to reward paradoxical conduct while confounding straight forwardly logical action, by yielding results ironical if not lethally self-damaging.[27]

The concept of the center of gravity is not a mechanism for dealing with this "paradoxical logic." The linear based concept is the ultimate in logical decision making linking purpose, resources, and objectives to achieve what is perceived as the endstate of the conflict. David Jablonsky in Operational Art Across the Spectrum of

Conflict; discusses the importance of unifying concepts that tie together actions taken at each level of war.

"In the context of the strategic-operational interface strategic considerations will make extraordinary demands on the character and ability of operational and tactical commanders as well as on the morale and discipline of their forces. Thus reinforcing the need for an overall unity of concept from the highest to the lowest levels of war."[28]

Largely the center of gravity fills that role for U.S. forces however, the various interpretations of the concept work against true unity in application. For instance the basic doctrinal manuals of each service has a different interpretation of what constitutes the center of gravity. The Marine Corps manual FMFM 1, Warfighting, says the center of gravity is a vulnerability.[29] The U.S. Airforce Manual 1-1 gives four definitions including aircraft limits to ensure safe flight.[30] The Army's 1986 definition was mentioned earlier, the 1993 version is not significantly different. The tendency of planners to impose order and clarity through use of the concept leads to the blending of, center of gravity, critical vulnerabilities, decisive points, into a doctrinal soup which intentionally or not, produces conceptual distortion.[31]

This conceptual distortion a kind of "quasi-magical thought," leads planners to make decisions and act based on a false sense of reality.[32] Therefore, in the absence of information on what an opponent will do operational planners look for signs of his strength to justify the actions taken.

In contrast, a systems approach acknowledges the complexity involved with operations at any level. Furthermore, contrary to attempts to order this complexity seeks to foster maximum distortion in the rival system crippling opponents' ability to control not only his forces, but also his whole system.

When considering engagements, operational planners must allow for the presence of "paradoxical logic." Planners must broaden their perspective to account for the non-rational actors, who will confound a search for clarity in operational purpose and strategic endstate. The systems approach is a vehicle for expanding perspective, since the whole nature of the system is evaluated for those areas that are most vulnerable to paralysis.

CHAPTER V

ANALYSIS

5.1 SYSTEMS THINKING

The concept of center of gravity has been discussed in some detail, and comparisons between it and a systems approach have been made, all without defining this approach or even what's meant by systems. In this section a systems approach is defined along with what differentiates the theory of systems from the concept of center of gravity. In addition, comparisons between the two are made where applicable.

What is a systems approach to warfare? It is a process of looking at the whole of an opponents system for those characteristics, and capabilities that make it viable. The systems approach is holistic in nature and assumes the presence of complexity in the systems evaluation. A systems approach acts counter to the center of gravity's linear cause and effect model in that it deals with "organized complexity,"[33] where cause and effect are unpredictable.

There are two types of systems those that are open to their environment, and those that are closed.[34] The open system is the only one that is discussed here, because it is characterized by the import and export of materials, energy

and information.[35] With this in mind, the enemy's systems should be considered open because social systems by the above definition are open.

One of the real values of a systems approach is it can be used to achieve a measure of compromise between the services different interpretations of operational doctrine. This approach could "point out similarities between theoretical constructions, reveal gaps in understanding, and provide a common operational language by means of which experts in different disciplines could communicate with each other."[36]

This common operational language need not discard the other operational concepts currently used to create a coherent framework; it would incorporate these terms into a new model for operational design. The new design would be all-inclusive able to articulate the goals and objectives for operations from a system perspective and to act within the realm of "organized complexity."

Within this realm, planners will not try to shape the battlefield to suit immediate needs but make needs suit the battlefield. U.S. planners using a systems approach can induce the maximum amount of chaos into the rival system

affecting it across all domains making coherent action impossible.

This approach will work counter to the reductionism inherent in the linear based concept of center of gravity. It will force the new operational level systems thinker to look beyond seeing only "snapshots of an adversary's system and posing simple answers to complex problems."[37] To an alternative "process thinking" view that fosters the development of "Systems Archetypes."[38] This is nothing more than developing models of an opposing system that allow planners to determine what processes will be effective against the rival system. Senge says:

> The purpose of the systems archetypes is to recondition or perceptions, so as to be more able to see structures at play, and to see the leverage in those structures. Once a systems archetype is identified, it will always suggest areas of high and low-leverage change."[39]

This concept far from being some space age nonsense is exactly what the U.S defense establishment did in evaluating the possibility of war with the former Soviet Union. Today's military force is a reflection of what was determined from the evaluation of the Soviet system. The U.S. through a detailed analysis of the Soviet system

developed within budget constraints a military force that could challenge it.

This evaluation of the Soviet "system archetype" revealed exactly the areas of leverage that Senge describes. The U.S leveraged technology and quality to offset Soviet numerical superiority. Military leaders focused on developing leadership and initiative to the lowest levels, to combat battlefield chaos, and planners changed doctrine to reflect the importance of the operational level in achieving strategic goals.

In effect, the U.S changed its system, based on the lessons learned from the rival system. The new system fully developed scored an impressive triumph in Desert Storm, validating the years and budget dollars spent in developing it, and also demonstrating the advantages of taking a systems approach to warfare

The subject of Desert Storm as a systems approach versus a validation of the center of gravity concept is discussed in the next section on systems shock / paralysis. Suffice it to say here that the force employed there was a system developed in response to a perceived threat from a competing system.

If a systems approach was so successful in developing and using U.S. forces why do operational planners continue to use the linear based concept of center of gravity, to determine where, when and how to act? One possible explanation is the mix of operational concepts such as center of gravity, critical vulnerabilities, critical nodes and decisive points, leads to the services taking a quasi-systems approach.

The reason that planners continue to use the idea of attacking the centers of gravity despite evidence to the contrary is twofold. The constant exposure to the doctrinal importance of the concept makes application almost reflexive. "Doctrine says it exists so in all cases it will exist." In the latter case it simply conflicts with deeply held individual ideas of how things work, that limit response to new concepts by reverting to the familiar ways of thinking that influence how planners take action.[40] In other words, "if it's not broke don't fix it."

In either case the reliance on the concept has become so deeply rooted that no plan is acceptable without identifying the center of gravity at each level. This occurs regardless if the tactical or operational realities

argue against defining such an "elusive" target for actions.[41]

5.2 OPERATIONAL SHOCK/PARALYSIS

> In war, we often see the collision of centers of gravity, great concentrations of combat power at decisive points. These battles-can occur sporadically throughout the depths of the theater of war with one ultimate moral objective. This is the raw destruction of the enemy's will to resist. For it is the strength of will to resist that provide the cohesion, the coherence, to these centers of gravity in collision. But the essence of operational art is the avoidance of these head-on collisions. the operational artist seeks to maneuver dispersed. He swarms to create a center of gravity faster than his opponent (agility). He creates this concentration of combat power at the decisive point and time (synchronization).[42]
>
> Schneider and Izzo

Operational shock is systems theory applied to military actions. The Russians developed the theory of operational shock during the interwar period, in response to the disillusionment with the universal focus on achieving the single decisive battle prevalent in World War I. The Russians recognizing that complete destruction of military systems was impossible developed alternative approaches for defeating military systems.[43] In developing these alternatives came the recognition of a level of

military coherence between the tactical and the strategic that would dominate future military actions.

This level coined the operational level by Russian theorists, was intensively analyzed for characteristics and inherent weaknesses.[44] Out of this analysis they developed means to shock the system, oriented on fragmentation of the system into its component parts rendering it unable to function.[45] This would be accomplished by attacking the system in both the horizontal dimension, along its front, and vertical dimension, throughout its depth. This is designed to prevent cooperation between its formations frontally, and in depth, making the entire operational command and control process untenable.[46]

In essence, this would cause paralysis and eventual collapse of the rival system. It is important to note that the entire process views the rival military as a system with "areas of high and low leverage." The author has significantly over simplified this entire process, but will point out similarities and contrast theories that have direct bearing on the role of the concept of center of gravity within the overall theory of operational shock.

The Soviet version of operational art depends on the concentration of combat power, achieved through the massing

of material and effects. Western military experts often associate the Soviet theory of mass as focusing on numbers, there is this aspect but only in pursuit of the overall operational depth required to form a "critical force" beyond an opposing systems mass center.[47] In essence, the Soviets pursuit of mass sought to create overwhelming concentrations of combat power throughout the depth of the theater to set the terms of operations.

In close parallel was the Soviet concept of center of gravity, as an inductive instead of deductive process.[48] In other words by identification of the exact points of strength and weakness in the opposing system, they sought to create and exploit operational vulnerabilities, to achieve decision. Dr Schneider in his discussion on the "elusive nature of centers of gravity" argues essentially the same thing. Centers of gravity are not identified through a deductive process, as the current interpretation of the concept would have planners believe. Centers of gravity occur as a result of a cognitive inductive process, where operational maneuvers dispersed in time, and space, sequentially, and simultaneously create the conditions for decision at the operational level.

The following excerpt from General Schwarzkopf's intent statement for conduct of Operation Desert Storm, supports the argument that a systems approach, specifically operational shock was a prime ingredient of the conduct of operations it says:

> We will offset the imbalance of ground combat power by using our strengths against his weakness. Initially execute deception operations to focus his attention on defense and cause incorrect organization of forces. We will initially attack into Iraq homeland using air power to decapitate his leadership, command and control, and eliminate his ability to reinforce Iraqi forces in Kuwait and Southern Iraq. We will then gain undisputed air superiority over Kuwait so that we can subsequently and selectively attack Iraqi ground forces with air power in order to reduce his combat power and destroy reinforcing units. Finally, we will fix Iraqi forces in place by feints and limited objectives attacks followed by armored penetration and exploitation to seize key lines of communications nodes, which will put us in a position to interdict resupply and remaining reinforcements from Iraq and eliminate forces in Kuwait.[49]

Notably absent from this excerpt is any mention of the centers of gravity, but it does describe the conditions that U.S and Allied forces would seek to induce. This condition achieved through deception, suprise, fragmentation and simultaneity produced operational shock and conflict

termination in an amazingly short period. What role did center of gravity play in the final decision? In a physical and mechanistic sense very little, the Republican Guard defined by planners as the operational center of gravity survived the conflict virtually intact. The 1993, version of FM 100-5, Operations, notes:

> The Iraqi Republican Guard is a good example of a center of gravity. Although not located in Kuwait, it was the real source of power necessary for Iraq to hold that country. The destruction of the Republican Guard was seen as the center of gravity for achieving the strategic goal of removing the Iraqi forces from Kuwait.[50]

If the Republican Guard was the operational and strategic center of gravity as defined in this excerpt how did it survive intact and the U.S still manage to achieve its aim in liberating Kuwait? The answer is very simple; U.S. forces operating within a systems framework made the supposed center of gravity irrelevant.

However, in a conceptual sense a center of gravity did exist, induced by the synergism inherent in a systems approach. In essence, the operational center of gravity did not reside in the Republican Guard or in Hussein. The operational center of gravity lay in the "cognitive tension," (the characteristic that binds strategic aims to

operational goals and tactical objectives) existing between the strategic, operational, and tactical levels of war.[51] By disrupting this "cognitive tension" coalition, forces rendered the system unable to control its functions thus creating paralysis.

5.3 CONFLICT IN THE INFORMATION AGE

> If houses were built like computers, the first woodpecker to come along would bring down civilization.[52]
>
> Stratton

What are the doctrinal implications of the victory in the Persian Gulf? The overriding implication at least from the standpoint of terms and principles is no change. Current U.S. Joint and Army doctrine still considers the linear based center of gravity as the centerpiece of the operational art. The danger here is the world has changed since Desert Storm. The new threats facing U.S. forces are increasingly asymmetrical. This is only natural since to challenge the U.S in a conventional way would in all likelihood result in defeat.

The challenge to the U.S military is to ride the crest of the post-industrial, information age wave, and develop concepts that deal with the proliferation of information

technologies in the hands of nations or actors inimical to the U.S.

There is little argument that the military is meeting the first requirement, evidenced by the Army's Force XXI, and AAN initiatives. The question becomes is doctrine progressing apace?

The author recently had the opportunity to observe the Army's Force XXI, networked digital division during a Warfighter Ramp-up. The experience left some indelible impressions. The Divisions digital systems had a great ability to obtain near real-time data. This allowed the planning staff to streamline the orders process, and digitally provide situational awareness down to the lowest levels.

However, all this technology and it's great potential was still unable to discern the OPFOR center of gravity. This was left to the planners, and using the linear logic inherent in the concept they deduced and destroyed the supposed OPFOR center of gravity. The destruction of this supposed center of gravity had no effect on the OPFOR ability to continue fighting.

The OPFOR resilience eventually forced the division to culminate short of its objective reset, and conduct the

operation again. The response to the division's failure to achieve its objective and the subsequent loss of combat power was that the center of gravity changed.[53] There was never a question as to whether it existed in the first place."[54]

The situation related above is analogous to the potential U.S problem of operations in the information age. The complexity involved in future operations can only be acerbated by operating along a line of thought applicable mainly to conventional "peer competitors" fighting like U.S. forces.

The potential emergent threat facing the U.S may not have a structure that readily reveals itself as the center of gravity and yet will still be a hierarchically organized complex adaptive system. Its potential to frustrate U.S operational goals will be far out of proportion to its perceived level of development i.e., Somalia, and Bosnia. Its access to information technology and weaponry will be astonishing, and above all, it will not act in a way planners consider rational, because their system may reward irrational behavior.

The U.S challenge in facing such a threat is understanding that there is not a right answer for dealing

with this complexity.[55] Only in taking a systems approach can U.S. planners cope with the unpredictable adaptive nature inherent in any social system. Moreover when deciding on engagement in this complex uncertain environment doctrine must be tailored to suit the situation. Planners must induce in the system the desired conditions, instead of trying to fit the situation to doctrinal concepts like the linear based center of gravity. British theorist Liddell Hart says:

> Adaptability is the law, which governs survival in war as in life-war being but a concentrated form of the human struggle against environment. To be practical, any plan must take account of the enemy's power to frustrate it; the best chance of overcoming such obstruction is to have a plan that can be easily varied to fit the circumstance met; to keep such adaptability; while still keeping the initiative, the best way is to operate along a line which offers alternative objectives.[56]

The concept of center of gravity at least as its presently understood is linear logic applied to a non-linear asymmetrical environment, and assuming planners want a concept applicable to any environment, is the antithesis to a systems approach.

CHAPTER VI

CONCLUSION

The pattern of present and future U.S engagement argues for a new paradigm. A paradigm that is capable of coping with the increasingly complex and ambiguous nature of operations in the information age. The concept of center of gravity outside of systems theory does not provide an answer that seems applicable to this new environment. However, the concept of center of gravity within a systems approach does.

Furthermore, the confusion of center of gravity, decisive points, critical nodes, and vulnerabilities adds to the difficulty in applying the concept effectively. The new doctrinal paradigm, directed at evaluating entire systems for areas of leverage or nexus points would serve to foster the aforementioned seamless understanding between services. The systems approach would link all the current doctrinal concepts into one overarching theoretical framework applicable to engagement across the spectrum.

What does a new paradigm entail for the concept of center of gravity? Within this new doctrinal framework, the concept has renewed relevance. Systems nexus points become centers of gravity, instead of a linear potentially

erroneous process of deduction, planners will evaluate entire systems to discern ways to induce or create the desired conditions.

The new operational planner a systems thinker, will have a wealth of options to choose from when planning campaigns. The systems thinker, along with his doctrine will create a new level of operational coherence, by eliminating divisive concepts such as the linear based center of gravity. This systems thinker will be conscious of the hierarchical adaptive nature of a rivals system, and equipped to deal with its complexity.

The implication for Joint and Army doctrine is profound. The new doctrinal paradigm will devalue the linear based concept of center of gravity as the connective tissue of operational art, in favor of a more holistic systems based center of gravity. Joint and Army education particularly at the field grade level must focus on developing planners that think in terms of "whole entities," when developing engagement options. By disciplining current doctrine, changing it to fit new conditions, U.S planners can avoid the habit of changing after costly setbacks.

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