

REPORT DOCUMENTATION PAGE

Form Approved
OMB No. 0704-0188

Public reporting burden for this collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing this collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden to Department of Defense, Washington Headquarters Services, Directorate for Information Operations and Reports (0704-0188), 1215 Jefferson Davis Highway, Suite 1204, Arlington, VA 22202-4302. Respondents should be aware that notwithstanding any other provision of law, no person shall be subject to any penalty for failing to comply with a collection of information if it does not display a currently valid OMB control number. **PLEASE DO NOT RETURN YOUR FORM TO THE ABOVE ADDRESS.**

1. REPORT DATE (DD-MM-YYYY)		2. REPORT TYPE	3. DATES COVERED (From - To)		
4. TITLE AND SUBTITLE			5a. CONTRACT NUMBER		
			5b. GRANT NUMBER		
			5c. PROGRAM ELEMENT NUMBER		
6. AUTHOR(S)			5d. PROJECT NUMBER		
			5e. TASK NUMBER		
			5f. WORK UNIT NUMBER		
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES)			8. PERFORMING ORGANIZATION REPORT NUMBER		
9. SPONSORING / MONITORING AGENCY NAME(S) AND ADDRESS(ES)			10. SPONSOR/MONITOR'S ACRONYM(S)		
			11. SPONSOR/MONITOR'S REPORT NUMBER(S)		
12. DISTRIBUTION / AVAILABILITY STATEMENT					
13. SUPPLEMENTARY NOTES					
14. ABSTRACT					
15. SUBJECT TERMS					
16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT	18. NUMBER OF PAGES	19a. NAME OF RESPONSIBLE PERSON
a. REPORT	b. ABSTRACT	c. THIS PAGE			19b. TELEPHONE NUMBER (include area code)

United States Marine Corps
Command and Staff College
Marine Corps University
2076 South Street
Marine Corps Combat Development Command
Quantico, Virginia 22134-5068

MASTER OF MILITARY STUDIES

**CENTER OF GRAVITY:
A MODEL FOR THE 21ST CENTURY WARFIGHTER**

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

AUTHOR: MAJOR CHARLES C. NASH

AY 2017-18

Mentor and Oral Defense Committee Member:

Approved:

Date:

Oral Defense Committee Member:

Approved:

Date:

ORAL DEFENSE COMMITTEE MEMBER:

APPROVED

DATE:

16 MAY 18

James Lacey

JAMES LACEY

16 MAY 18

J. W. Burden

[Signature]

16 MAY 18

[Signature]

LTCOL OWEN J. NACCI

16 MAY 18

DISCLAIMER

THE OPINIONS AND CONCLUSIONS EXPRESSED HEREIN ARE THOSE OF THE INDIVIDUAL STUDENT AUTHOR AND DO NOT NECESSARILY REPRESENT THE VIEWS OF EITHER THE MARINE CORPS COMMAND AND STAFF COLLEGE OR ANY OTHER GOVERNMENTAL AGENCY. REFERENCES TO THIS STUDY SHOULD INCLUDE THE FOREGOING STATEMENT.

QUOTATION FROM, ABSTRACTION FROM, OR REPRODUCTION OF ALL OR ANY PART OF THIS DOCUMENT IS PERMITTED PROVIDED PROPER ACKNOWLEDGEMENT IS MADE.

Executive Summary

Title: Center of Gravity: A Model for the 21st Century Warfighter

Author: Major Charles C. Nash, United States Marine Corps

Thesis: Joint and service doctrine sufficiently evolved over the past 20 years to better synchronize and simplify their definitions of center of gravity, presenting a sufficient framework within which to conduct an analysis. While opportunities remain for the Marine Corps to increase consistency in the instruction and application of the concept, center of gravity (COG) stands as a still-relevant element in planning, applicable at all levels of war.

Discussion: Clausewitz first introduced the concept of center of gravity in the early 19th Century. In the 1980s, the U.S. military began to implement maneuver warfare doctrine, and the services started to directly incorporate the COG as a tool of analysis. From here, the definitions and understanding of the concept evolved over the subsequent 30 years. This paper determines the joint and service definitions of COG to be appropriate, understandable, and applicable at all levels of warfare, though in different ways. In the Marine Corps, the entry-level training continuum for officers provides rank-appropriate education. In the intelligence community, formal schools provide comprehensive study of multiple perspectives on COG, a suitable practice, while recommending an alternative primary model that varies from joint doctrine. While these contemporary models are sufficient, the lack of consistency in their application creates a risk for planners to be out of synch with the larger joint community.

Conclusion: Overall, the joint force and individual services effectively define COG. However, inconsistencies remain in doctrine beyond the basic definitions. While standard methodology for analysis now exists in doctrine, application continues to vary widely due to the multiple alternatives in analysis models. The Marine Corps has an opportunity to nest with evolving joint doctrine and to synchronize COG verbiage and methodology with every doctrine review and every course curriculum review in formal schools. Additionally, the Marine Corps should adopt a primary analysis model (Eikmeier + CARVER) while acknowledging that other models may apply to particular situations. Leaders at all levels should seek to understand contemporary models for the application of COG as well as how to more effectively apply the concept at different levels.

Table of Contents

	Page
DISCLAIMER.....	i
EXECUTIVE SUMMARY.....	ii
TABLE OF CONTENTS.....	iii
LIST OF FIGURES AND TABLES.....	iv
VIGNETTE.....	1
ORIGINS	3
MODERN THEORISTS.....	6
Strange	6
Eikmeier.....	6
DEFINED BY DOCTRINE.....	8
Joint Doctrine.....	8
Marine Corps Doctrine.....	9
Other Service Doctrine.....	11
BEYOND THE DEFINITIONS.....	12
Characteristics.....	12
COG Analysis.....	14
Strange Model.....	14
Strategic Ring Model.....	16
National Elements of Value Model.....	17
CARVER Model.....	18
APPLICATION.....	19
Centers of Gravity at the Strategic Level.....	20
Centers of Gravity at the Operational Level.....	20
Centers of Gravity at the Tactical Level.....	21
MARINE CORPS TRAINING AND EDUCATION.....	24
Officer Candidates School.....	25
The Basic School.....	26
Infantry Officer Course.....	28
Marine Corps Intelligence Schools.....	30
FINDINGS.....	31

RECOMMENDATIONS.....	33
ENDNOTES.....	35
BIBLIOGRAPHY.....	39

List of Figures and Tables

	Page
FIGURE 1: Characteristics of Center of Gravity.....	13
FIGURE 2: Center of Gravity Analysis.....	15
FIGURE 3: Center of Gravity Analysis Steps.....	16
FIGURE 4: Strategic Ring Model.....	17
FIGURE 5: National Elements of Value Model.....	18
FIGURE 6: The Tactical Planning Process.....	27
FIGURE 7: Commander’s Intent.....	29
TABLE 1: Iraqi Centers of Gravity, 1991.....	20
TABLE 2: COG Analysis for Operation Restore Hope.....	23

The year is 2025. II Marine Expeditionary Force (II MEF) recently embarked aboard amphibious and littoral shipping from the Navy's Fourth Fleet as part of a Combined/Joint Task Force (CJTF) in support of Operation Littoral Resolve. This task force yields the largest integrated Naval force operation since Operation Chromite brought Marines and soldiers to the beaches of Inchon in September, 1950 – 75 years prior. The purpose of this operation is to assist an ally nation in repelling an aggressive neighbor and simultaneously quelling a proxy-force insurgency.¹ This scenario reveals distinctly different centers of gravity (COGs) at the varying levels of command.

When framing the problem, the Secretary of Defense (SECDEF) identified the enemy's strategic center of gravity as the dictatorial regime. The self-appointed President-General led multiple border incursions and overtly threatened the sovereignty of a U.S. ally. He is an aggressive ruler who routinely violates human rights and maintains a firm grip on the population through intimidation and coercion. Department of Defense assessments determined that this particular dictator acts alone as his nation's "political strategic decision-making entity."² SECDEF further estimated that the removal of this regime by compulsion or force will immediately erode the willingness of his military leadership to continue cross-border expansion, effectively ending the conventional military threat.

As the task force commander, the Commander, U.S. Southern Command, views the enemy's operational center of gravity in two components, both physical. First, during joint forcible entry operations designed to gain a foothold in the operating environment and seize the initiative, she sees the COG as the enemy's anti-access/area denial systems. This radar and missile capability has the potential to limit the task force's ability to approach the objective area, as well as defend locally against landing. Neutralization or suppression of this capability

restores friendly freedom of maneuver critical for mission success. Additionally, during operations to dominate and subsequent stability operations, she views the enemy COG as his covert logistics capability supplying arms and munitions to the proxy insurgent force. Disruption of this resource will effectively reduce the insurgent ability to use force, allowing coalition forces to establish security and stability ashore.

To support the operation, the 24th Marine Expeditionary Unit tasked its “boat company” to seize an airfield near the coast for use as a forward armament and refueling point and eventual Expeditionary Advanced Base. The Battalion Landing Team commander identified the enemy’s tactical COG as his command and control, determining that disruption of his highly-centralized command structure would render subordinate units ineffective in their defense of the shore. Meanwhile, the company commander identified an additional tactical COG as the enemy’s crew-served weapons, as they provide his most lethal means to deny the Marines access to the beaches. Applying a combination of precision munitions against communications nodes and indirect fires against crew-served weapons will mitigate the risk to the landing force as it hits the beach. Meanwhile, the platoon commanders and squad leaders plan to execute local combined arms with fire and maneuver, avoiding enemy surfaces while attacking and exploiting gaps created by suppression and flanking maneuver.

This scenario captures the essence of the contemporary center of gravity:

- The COG exists at all levels of warfare, can be plural, and can change across phases*
- At the strategic level, the COG can be singular or plural, physical or moral*
- At the operational level, the COG can be singular or plural but is typically physical*
- At the tactical level, the COG is typically singular and should be physical*
- Small units avoid surfaces and exploit gaps while conducting tactical actions on an objective*

“It does not matter what Carl von Clausewitz said about the center of gravity (COG) in the 19th century. What matters is how we want to use the COG concept in the 21st century.”

-Dale C. Eikmeier, “Redefining the Center of Gravity”

Originally introduced by Carl von Clausewitz in the early 19th Century, the concept of “Center of Gravity” remains the subject of much debate and misunderstanding, even today. Though acknowledged in the latter half of the 20th Century by military scholars and strategists, the center of gravity made its first real appearance in mainstream doctrine in the 1980s with the advent of maneuver warfare doctrine as a viable option for the modern force. Since then, scholars, theorists, and military leaders have worked to define, redefine, and analyze, the topic ad nauseam – with its definition and application likely still not settled. Meanwhile, joint and service doctrine sufficiently evolved over the past 20 years to better synchronize and simplify their definitions of center of gravity, presenting a sufficient framework within which to conduct an analysis. The center of gravity stands as a still-relevant element in planning, applicable at all levels of war.

Origins

Military theorists and scholars continue to ponder contemporary definitions, applications, and models for center of gravity, evidenced by the myriad recommendations and articles regarding this subject, this thesis included. In the original (translated) text regarding the concept, Clausewitz uses a descriptive narrative to develop awareness and understanding of the center of gravity. When dissected, his narrative yields the following factors:

- always found where the mass is concentrated most densely
- presents the most effective target for a blow
- can strike/generate the heaviest blow³

- analogous in war when unity or cohesion are present
- possessed by forces of a single state or alliance of states
- the movement and direction of the COG governs the rest
- found wherever forces are most concentrated
- the cohesion of the parts determines and limits effects produced against it
- if struck by a blow stronger than required, the blow may be ineffective and wasteful⁴
- developed out of the dominant characteristics of a belligerent
- the hub of all power and movement⁵
- that on which everything depends
- the point against which all energies should be directed⁶

Though this list does not appear contradictory in nature, its contents encompass a broad enough theoretical swath through which one can easily understand the genesis of differing interpretations or applications of the concept. Later in this analysis, these factors will be juxtaposed against current doctrinal “characteristics.”

Aiming to clarify Clausewitz’s concept of COG for the joint community, professor of history and strategic studies Dr. Joe Strange partnered with former UK Army Doctrine Branch commander Richard Iron. Together, they published a two-part analysis of Clausewitz’s theory of COG, succinctly addressing multiple sources of confusion and discrepancy found in *On War*. This work also included a recommended analysis model for planners, which this paper will address in greater detail below. Strange and Iron focus on the differences between Clausewitz’s Book Six and Book Eight, providing amplification and context for their interpretation of his intended meaning. First, they assert that “Clausewitz’s discussion of centers of gravity in Book Six of *On War* is clear and straightforward.”⁷ Building upon Schneider and Izzo’s 1987 description of physical centers of gravity, Strange and Iron reinforce mass and concentration as key attributes of a COG while also focusing on the COG as a source of power – which informs current doctrine.⁸ Moreover, Strange and Iron highlight Clausewitz’s Book Eight as “the cause for considerable confusion.”⁹ This, they write, is the cause for COG to be described as a set of “characteristics” vice a physical or moral source. Their added context of the differences in

translation combined with confusion between the internal books of *On War* adds much-needed clarity to the incomplete work of Clausewitz.

During nearly the same period as Clausewitz, Baron Antoine-Henri Jomini authored *The Art of War*, which introduced or provided structure and clarity to several elements of strategy that still permeate contemporary doctrine, including his principles of war (principes généraux de l'art de guerre) and lines of operation (lignes d'opérations).¹⁰ Beyond these two highlights, however, some elements of Jomini's work clearly reflect Clausewitz's concept of center of gravity. As John Shy recalls in *Makers of Modern Strategy*, 'Albrecht von Boguslawski . . . asserted that he saw no reason whatsoever for setting the theories and conceptions of war of these two "erudite thinkers" in opposition to one another,'¹¹ despite the fundamental differences in their perspectives on the character of war.

Specifically, Jomini's discussion of massing at the decisive point carries with it clear similarities to Clausewitz's introduction of the center of gravity. In *The Art of War*, Jomini declares there to be "one great principle underlying all the operations of war."¹² He expands this into four maxims, which in summary state that the mass of the friendly force should be thrown upon fractions of the enemy force at a decisive point, at the proper time and with energy.¹³ In this assertion, his premise parallels Clausewitz's center of gravity. Whereas Clausewitz's center of gravity speaks directly to the concentration of mass, either physical or metaphysical, Jomini's decisive point is more the time and place that a massed force should engage. Regardless, elements of both serve to inform 21st Century U.S. joint and service doctrine.

Yet, herein lies the challenge – how does the United States Marine Corps, or any military force, extract from Clausewitz's weighty theory a simple and applicable definition of such a concept – particularly if additional theories provide amplifying considerations such as Jomini's

decisive point? Moreover, evolution and discrepancies within the joint force doctrine further highlight the challenges associated with simply defining center of gravity, let alone understanding it and applying it to the different levels of war.

Modern Theorists

Previously cited in this paper, Dr. Joe Strange emerged in the late 20th Century as a leading thinker on center of gravity. He, either solo or partnered, published a continuum of articles and papers regarding the concept and its (mis)application in doctrine but always advocated for its use. Specifically, he reinforced the idea of a moral COG, not simply a physical COG, providing citation and examples.¹⁴ Moreover, Strange crafted the center of gravity-to-critical vulnerability analysis model found in current doctrine and expanded upon below:

Centers of Gravity → Critical Capabilities → Critical Requirements → Critical Vulnerabilities

Joint Publication 2-01.3, *Joint Intelligence Preparation of the Operating Environment*, cites Strange's 1996 contribution to the Marine Corps University's *Perspectives on Warfighting* to synthesize the following example:

During the Battle of Britain in 1940, an operational *center of gravity* for Britain was the Royal Air Force Fighter Command. A *critical capability* for Fighter Command was the ability to meet Luftwaffe attacks in a timely manner. The *critical requirement* linked to that specific critical capability was advance warning regarding the timing, strength and direction of Luftwaffe attacks. The *critical vulnerability* linked to that specific critical requirement was the fragility and vulnerability of the British radar system that provided the advance warning. However, the Germans did not realize the importance of the radar system and did not follow up their early attacks against it.¹⁵

Retired Army Colonel and, at the time, Assistant Professor at the U.S. Army Command and General Staff College Dale Eikmeier published an article in 2010 providing his insights on the recently updated JP 5-0 and how it defined and applied COG. His argument fell partially in favor of Strange's work and that "joint doctrine needs to break from Clausewitz and develop new

definitions of the center of gravity and its critical factors based on the criteria of clarity, logic, precision, and testability.”¹⁶ Eikmeier further argued that any definition of COG must include those four criteria: clarity (answers the question “what is it?” and is simple to understand with limited meaning); based on logic (contains rules that allow for a valid inference); precision (narrowly focused to exclude the extraneous); and testable (can be objectively tested using rules and logic).¹⁷ Perhaps most significantly, Eikmeier re-sequenced the Strange model, proposing that COGs are actually derivatives of critical capabilities vice the opposite. His model appeared:

Objective(s) → Crit. Capabilities → COGs → Crit. Requirements → Crit. Vulnerabilities

Moreover, Eikmeier laid out six steps to determine the COG, critical requirements, and critical vulnerabilities:

- Step 1: Identify the organization’s desired ends or objectives.
- Step 2: Identify the possible “ways” or actions that can achieve the desired ends. Select the way(s) that the evidence suggests the organization is most likely to use. Remember: Ways are actions and should be expressed as verbs. Then select the most elemental or essential action—that selection is the critical capability. Ways = critical capabilities.
- Step 3: List the organization’s means available or needed to execute the way/critical capability.
- Step 4: Select the entity (noun) from the list of means that inherently possesses the critical capability to achieve the end. This selection is the center of gravity. It is the doer of the action that achieves the ends.
- Step 5: From the remaining items on the means list, select those that are critical for execution of the critical capability. These are the critical requirements.
- Step 6: Complete the process by identifying those critical requirements vulnerable to adversary actions.¹⁸

Eikmeier argues against ‘intangible’ COGs, claiming that a COG must be capable of actually conducting the action (critical capability) that achieves its objective. The assets that enable – but do not conduct – the action are simply critical requirements and not a COG.¹⁹

Defined by Doctrine

Joint Doctrine. Last year, the Lead Joint Doctrine Integrator from the Joint Staff Joint Doctrine Division provided an excellent synopsis of the origin and evolution of Joint Publication (JP) 3-0, *Doctrine for Joint Operations*. In his article that followed the most recent publishing of JP 3-0 (January 17, 2017), Rick Rowlett captured that the 3-0 “began with a January 1990 ‘test publication’ titled *Doctrine for Unified and Joint Operations*,” and the joint staff published the “first official version of JP 3-0 in 1993” while releasing the first hard-copy JP 3-0 in 1995.²⁰ In this initial printed edition, the joint staff defined center of gravity as “those characteristics, capabilities, or locations from which a military force derives its freedom of action, physical strength, or will to fight.”²¹ *Presently, Joint Publication 5-0, Joint Planning, defines center of gravity as “a source of power that provides moral or physical strength, freedom of action, or will to act.”*²² This definition frames the COG as a “source of power,” reflecting updated verbiage from the 2006 iteration of JP 5-0, which still called the COG “set of characteristics, capabilities, and sources of power.”²³ Though a minor change, the current “source of power” provides more focus and is more logical to apply in analysis than a “set of” anything. The same definition also appears in JP 2-01.3. Though several other Joint Doctrinal Publications consistently mention center of gravity, including the current Joint Publication 3-0, *Joint Operations*, they typically do so as a component to some other aspect of the doctrine, to be further discussed below. Additionally, joint doctrine invokes Jomini with inclusion of his decisive point alongside COG as an element of operational design. JP 5-0 describes a decisive point as “a geographic place, specific key event, critical factor, or function that, when acted upon, allows commanders to gain a marked advantage over an adversary or contribute materially

to achieving success.”²⁴ To simplify, a decisive point is often the situation in time and space that provides opportunity to directly or indirectly access a COG.

Marine Corps Doctrine. Marine Corps Doctrinal Publication (MCDP) 1-0 (w/change 1), *Marine Corps Operations*, defines COG identically to current joint doctrine. MCDP 1-1, *Strategy*, defines Center of Gravity slightly differently – as “a key source of the enemy’s strength, providing either his physical or his psychological capacity to effectively resist.”²⁵ MCDP 1, *Warfighting*, defines Center of Gravity even less directly, as having “factors . . . critical to the enemy . . . [that] the enemy [can]not do without . . . which, if eliminated, will bend him most quickly to our will.”²⁶ Of note, the original iteration of *Warfighting*, Fleet Marine Force Manual 1 (FMFM 1), predated MCDP 1 by eight years. In this first document, Marine Corps doctrine expressly captured critical vulnerability as the keystone of an objective, outright omitting COG. The following extracts from “Chapter 2, The Theory of War” show the evolution in Marine Corps doctrine from 1989 to 1997:

It is not enough simply to generate superior combat power. We can easily conceive of superior combat power dissipated over several unrelated efforts or concentrated on some indecisive object. To win, we must concentrate combat power toward a decisive aim.²⁷

Source: FMFM 1, *Warfighting* (35)

The 1989 manual continues:

Therefore, we should focus our efforts against a *critical enemy vulnerability*. Obviously, the more critical and vulnerable, the better.²⁸

Source: FMFM 1, *Warfighting* (36)

With no mention of COG in the actual text of the original edition of *Warfighting*, endnote 28 attempts to provide the reader appropriate context:

28. Sometimes known as the *center of gravity*. However, there is a danger in using this term. Introducing the term into the theory of war, Clausewitz wrote (p. 485): “A center of gravity is always found where the mass is concentrated the most densely. It presents the most effective target for a blow; furthermore, the heaviest blow is that struck by the center of gravity.” Clearly, Clausewitz was advocating a climactic test of strength against strength “by daring all to will all” (p. 596). This approach is consistent with Clausewitz’ historical perspective. But we have since come to prefer pitting strength against weakness. Applying the term to modern warfare, we must make it clear that by the enemy’s center of gravity we do not mean a source of strength, but rather a critical vulnerability.²⁷

FMFM 1 represented the initial publishing of the maneuver warfare concept as Marine Corps doctrine. While the manual attempted to provide clarity in the form of an endnote, the COG concept remained vague. With maneuver warfare as the Corps’ new approach to warfighting, authors clearly made deliberate effort to avoid the attritionist concept of strengths pitted against strengths, therefore relegating COG to reside among the publication’s notes. Moreover, when attempting to modernize the COG for the emerging concept of maneuver warfare, FMFM 1 explicitly described the center of gravity as a critical vulnerability – a paradox now easily recognized as unsuitable for modern use. However, after the COG appeared in joint doctrine in 1993, the Marine Corps aptly followed suit. In the 1997 revision of *Warfighting*, the Marine Corps not only included COG in the revised text, COG itself became a noteworthy element of mission analysis.

It is not enough simply to generate superior combat power. We can easily conceive of superior combat power dissipated over several unrelated efforts or concentrated on some inconsequential object. To win, we must focus combat power toward a decisive aim. There are two related concepts that help us to think about this: *centers of gravity* and *critical vulnerabilities*.

Source: MCDP 1, *Warfighting* (45)

The final sentence in the above excerpt from the 1997 edition of *Warfighting* notes the now-emphasized inclusion of COG in Marine Corps Doctrine. After a mere footnote on COG in 1989, the Marine Corps included three pages in the 1997 re-write. However, while detailed and useful, the portion of *Warfighting* that describes COG is 20 years old, reflects more “Clausewitzian” language, and no longer matches the current verbiage in joint doctrine.

Other Service Doctrine. With the presence and clarity of COG in joint doctrine expanding over the previous 25 years, all the services now capture it within their respective planning or operations doctrine. While Robert Dixon provided a synthesis of the different service applications of COG to support his argument that COG is outdated, elements of his analysis no longer apply due to the continued refinement of joint and service doctrine.²⁸ The U.S. Navy addresses COG in Navy Warfare Publication (NWP) 5-01, *Navy Planning*. While the publication acknowledges the current joint definition of COG, the December 2013 edition of NWP 5-01 further defines COG as “critical strengths that actually accomplish objectives at specific levels of war,”²⁹ tying the COG to objective attainment. Moreover, Navy doctrine reinforces that at the operational level of war, COG is “typically . . . a physical force.”³⁰

Meanwhile, in ADRP 3-0, *Operations*, the U.S. Army mirrors the joint definition of COG as a “source of power . . .”³¹ Similar to the Navy, the Army also reflects on the need to tie COG to objectives, describing it as “only meaningful when considered in relation to the objectives of the mission.”³² Paralleling joint doctrine, the Army also ties the decisive point to COG: “Commanders identify the decisive points that offer the greatest physical, temporal, or psychological advantage against centers of gravity.”³³

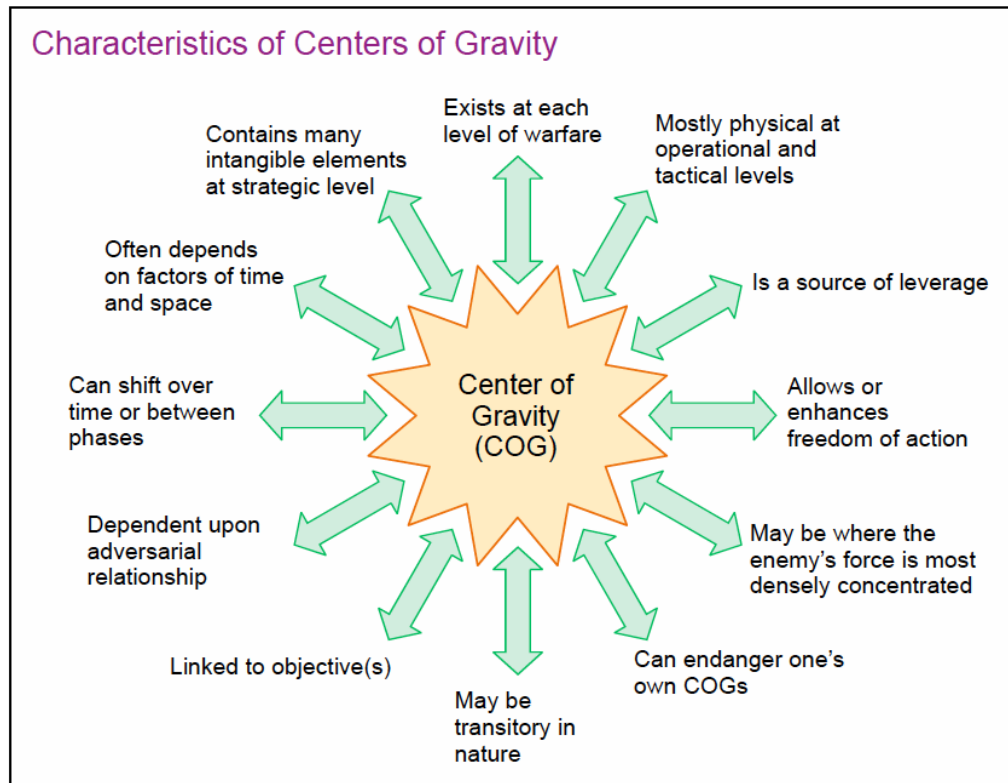
Lastly, the Air Force also mirrors the COG definition found in JP 5-0. Of note, Air Force Doctrine Annex 3-0, *Operations and Planning*, cautions that the “process of COG analysis may also lead to a mental image of a static adversary . . . [therefore] the best correctives to this oversimplification are to study the adversary thoroughly, respect the adversary as capable and willing to fight wherever and whenever possible, and accept that the adversary could be employing a strategy which we may find hard to understand.”³⁴ Similar to the other services’ assessment of COG, the Air Force also identifies that “COGs can emerge or change over time, due to the interplay of friendly, adversary, and other forces in the operational environment. They may be based on the end state, mission, and objectives as well as the adversary’s strategy.”³⁵ The Air Force, like other services, now identifies that a COG should be tied to an objective or objectives.

Marking a positive development from previous years, current editions of doctrine across the joint community now reflect a consistent definition of COG. Beyond the definition, however, the services take different approaches to both the weight and methodology assigned to COG.

Beyond the Definitions

Both *Joint Planning* and *Joint Intelligence Preparation of the Operating Environment* display the identical graphic (Figure 1 below) which outlines twelve “characteristics” of the center of gravity:

Figure 1, Characteristics of Centers of Gravity



Source: JP 5-0, Joint Planning (IV-24)

Of these, several demonstrate linkage to Clausewitz, while a few remaining characteristics do not demonstrate any clear linkage to the origins of center of gravity. The clearly-linked characteristics include:

Doctrine: May be where the enemy's force is most densely concentrated
 Clausewitz: *Always found where the mass is concentrated most densely*
Found wherever forces are most concentrated

Doctrine:	Dependent on adversarial relationship
Clausewitz:	<i>That on which everything depends</i> <i>Possessed by forces of a single state or alliance of states</i>
Doctrine:	Allows or enhances freedom of action
Clausewitz:	<i>The movement and direction of the COG governs the rest</i> <i>The hub of all power and movement</i>
Doctrine:	Is a source of leverage
Clausewitz:	<i>Developed out of the dominant characteristics of a belligerent</i> <i>The hub of all power and movement</i>
Doctrine:	Contains many intangible elements at the strategic level
Clausewitz:	<i>Analogous in war when unity and cohesion are present</i> <i>The cohesion of the parts determines and limits effects produced against it</i>
Doctrine:	Can endanger one's own COG
Clausewitz:	<i>Can strike/generate the heaviest blow</i>
Doctrine:	Linked to objective(s)
Clausewitz:	<i>Presents the most effective target for a blow</i> <i>The point against which all energies should be directed</i>
Doctrine:	Exists at each level of warfare
Clausewitz:	<i>Possessed by forces of a single state or alliance of states</i>

Overall, most of Clausewitz's "factors" of the COG nest within joint doctrine; however, four doctrinal "characteristics" of the COG do not reside within Clausewitz's factors: that COGs are mostly physical at operational and tactical levels, may be transitory in nature, can shift over time or between phases, often depend on factors of time and space. All four of these characteristics hold relevance in contemporary analysis and planning and are worthy of inclusion in joint doctrine.

COG Analysis. JP 2-01.3, *Joint Intelligence Preparation of the Operational Environment*, states that the "most effective method for JIPOE analysts to identify adversary COGs is to visualize each COG's role/function relative to each of the various systems and subsystems."³⁶ Continuing, JP 2-01.3 employs the "Strange Model" for COG analysis, also

known as the “Joint Model.” Outlined below, Navy and Air Force doctrine capture this three-factor analysis model of critical capabilities, critical requirements, and critical vulnerabilities:

- (1) Critical capabilities are those means that are considered crucial enablers for a COG to function as such, and are essential to the accomplishment of the adversary’s specified or assumed objective(s).
- (2) Critical requirements are the conditions, resources, and means that enable a critical capability to become fully operational.
- (3) Critical vulnerabilities are those aspects or components of critical requirements that are deficient, or vulnerable to direct or indirect attack in a manner achieving decisive or significant results.³⁷

In Figure 2 below, the Marine Corps’ MAGTF Staff Training Program (MSTP) provides an example of the linkage from an objective to the critical vulnerabilities upon which friendly forces will orient to defeat that COG. However, the sequencing presented in this graphic reflects Eikmeier’s work vice the Strange Model found in joint doctrine – deriving COG from critical capability – while joint doctrine reflects critical capability/capabilities coming from the enemy COG.

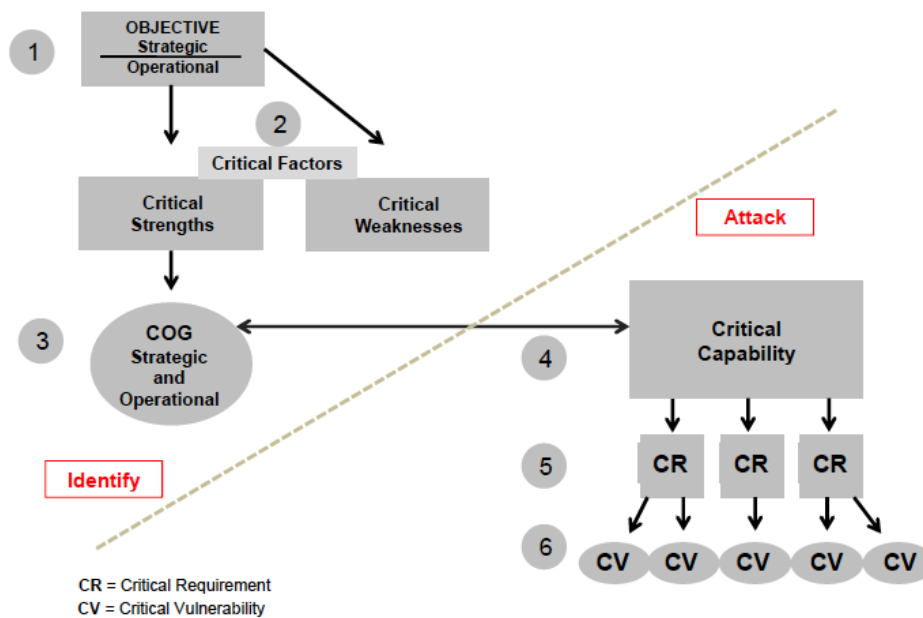
Figure 2, Center of Gravity Analysis

<p>1 <u>Adversary:</u> 1st. Motorized Infantry Division <u>Mission:</u> Conduct an area defense to defeat the MEF and retain Port City in order to deny key APOD/SPOD to the JTF. <u>Conditions:</u> Severely constricted terrain with excellent cover and concealment favors defense</p>	
<p>2 Critical Capability The ability to mass indirect fires on predictable landing areas and avenues of approach.</p>	<p>3 Center of Gravity 110th Integrated Fires Brigade</p>
<p>4 Critical Requirements</p> <ol style="list-style-type: none"> 1. Artillery Tubes 2. Surface-to-Surface Missile Launchers 3. Air Defense Assets 4. Camouflage, Cover and Concealment 5. Deceptive Positions 6. Ammunition Resupply 7. Radio Communication Architecture 8. Forward Observers 9. Battlefield Surveillance and C-B Radars 10. Unmanned Aerial Vehicles 11. Automated Fire Control Systems 	<p>5 Critical Vulnerabilities</p> <ol style="list-style-type: none"> 7. Radio Communication Architecture 9. Battlefield Surveillance and C-B Radars 10. Unmanned Aerial Vehicles 11. Automated Fire Control Systems

Source: MSTP Pamphlet 5-0.1, *Marine Corps Design Methodology* (42)

Further, NWP-1 provides a “zoomed out” overview that links all the way from strategic and operational objectives to potential critical vulnerabilities (Figure 3). This model also reflects the inclusion of “critical factors” from which to select a COG or COGs:

Figure 3, Center of Gravity Analysis Steps



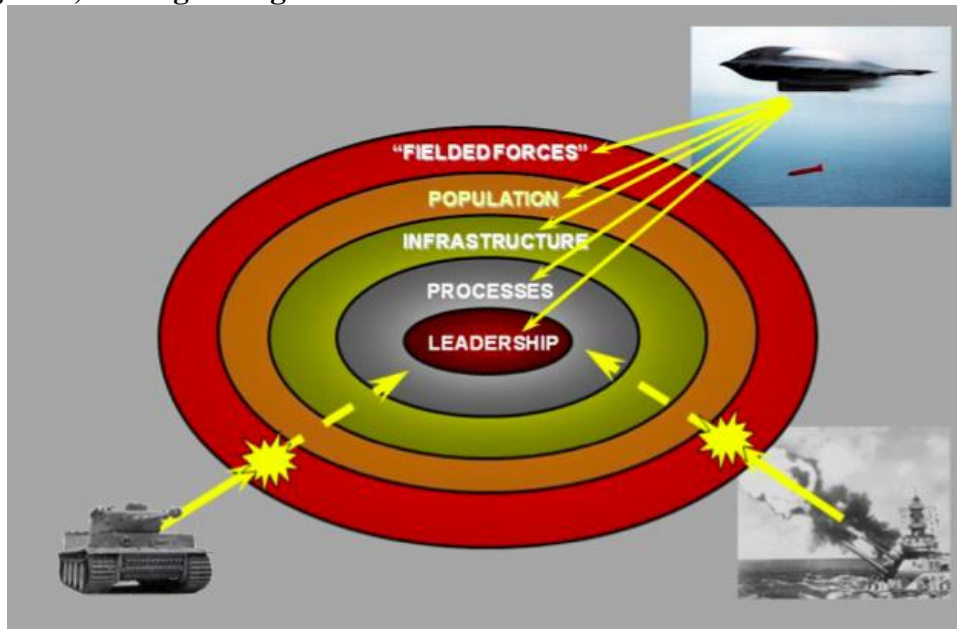
Source: NWP-1, *Navy Planning (C-2)*

As previously mentioned, the Air Force’s *Operations and Planning* acknowledges the COG analysis model found in JP 5-0, further identifying it as the “Marine Corps Model,” the “CG-CC-CR-CV Model,” and the “Strange Model,” described above.³⁸ Beyond this, *Operations and Planning* describes three additional methods: the Strategic Ring Model, the National Elements of Value Model, and the CARVER Model.³⁹

The *Strategic Ring Model*, also known as the “Five-Rings Model” or as “Warden’s Rings,” establishes the premise that the enemy system is a series of concentric “rings,” each dependent on the previous, and that each ring holds one or more COGs.⁴⁰ This method provides

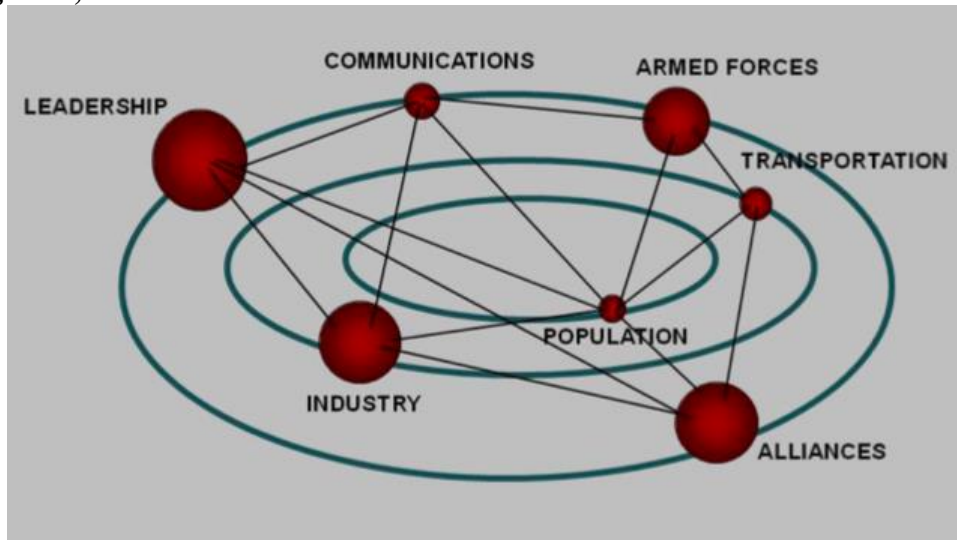
little utility to a primarily ground maneuver force such as the Marine Corps, because it makes no discernment of critical vulnerabilities, nor does it provide paths for attack in keeping with maneuver warfare doctrine. Moreover, it treats the enemy structure as static, failing to account for interactive and evolving systems.

Figure 4, Strategic Ring Model



Source: Annex 3-0, *Operations and Planning* (App. A)

The *National Elements of Value Model*, also known as the “NEV Model” or as “Barlow’s Model,” builds on the foundation of the Strategic Ring Model, replacing the concentric and static nature of the model with an interdependent, systems-based model. This model provides for a more sophisticated view of a COG system.⁴¹ However, it again creates a set of fixed nation-state characteristics, making the bold assumption of rationality by a potential irrational actor. Though the model allows for some fluctuation in the ‘weight’ of the nodes in this system, its rigidity still limits a commander or planner’s ability to independently analyze an enemy system; therefore, this model is also of limited utility for Marine Corps operational design and tactical actions.

Figure 5, National Elements of Value Model

Source: Annex 3-0, *Operations and Planning* (App. A)

Lastly, the *CARVER Model* provides a useful tool for determining the legitimacy of COGs or perhaps even critical requirements. The acronym CARVER represents criticality, accessibility, recuperability, vulnerability, effect, and recognizability.⁴² Found in JP 3-05.2, *Joint Tactics, Techniques, and Procedures for Special Operations Targeting and Mission Planning*, special operations commanders and staffs use this method “during target analysis to evaluate the relative merit of striking a target under consideration.”⁴³ The Air Force’s *Operations and Planning* offers this model as “a means to help analyze which COG to act against, given determination by other methods.” For the Marine Corps, this model provides a simple tool to use in series with another model (e.g. Strange, Eikmeier) to validate the process, similar to the broad evaluation criteria a commander uses during the Marine Corps Planning Process (MCP). In MCP, the commander evaluates if a potential course of action is suitable, feasible, acceptable, distinguishable, and complete.⁴⁴ Similarly applied, a planner or commander could ask if a proposed COG is critical (important to completion of the friendly mission), accessible (able to be influenced by friendly action), able to be recouped (easily reconstituted

with minimal time or resources), vulnerable (able to be attacked with available resources), effectible (will attack against this COG achieve friendly goals), and recognizable (identifiable to facilitate engagement).

Application

From joint doctrine, the concept of center of gravity “exists at each level of warfare.”⁴⁵ This section explores the doctrinal references to the three levels of warfare and, as applicable, provides examples. JP 2-01.3, *Joint Intelligence Preparation of the Operating Environment*, expands by stating that COGs are “always linked to the objective. If the objective changes, the COG could also change.”⁴⁶ Moreover, JP 2-01.3 clearly states that “COG typically will not be a single node in the system, but will consist of a set of nodes and their respective links. However, a single node might be considered a COG as an exception.”⁴⁷ Therefore, in keeping with joint doctrine, COGs exist at each level, must be linked to the/an objective, can change, and can be singular or plural at a given level. Table 1, from MSTP Pamphlet 5-0.2, *Operational Planning Team Leader’s Guide*, depicts Iraqi COGs at all levels of war in 1991. This table provides reference for the subsequent discussion.

Table 1: Iraqi Centers of Gravity, 1991

LEVEL OF WAR	COALITION SAMPLE MISSIONS	SAMPLE OPPOSING IRAQI COG	WHY IT'S A COG
Strategic Level			
• National Strategy	Restore the Government of Kuwait	Saddam Hussein	Has popular support Can order Iraqi Army to hold Kuwait
• Theater Strategy	Defeat the Iraqi Army South of the Euphrates	Iraqi Army	Can defend occupied Kuwait from Coalition attack
Operational Level			
• Campaigns	Encircle & destroy Iraqi Army in Kuwait	Republican Guard	Can prevent the encirclement of Iraqi Army in Kuwait
• Major Operations	Cut LOC between Baghdad and Kuwait	Iraqi Integrated Air Defense System	Can prevent air from cutting Baghdad-Kuwait LOC
Tactical Level			
• Battles	Penetrate Iraqi defenses along Saudi border	Iraqi 12 th Corps	Can prevent VII Corps penetration of Iraqi linear defenses
• Engagements	Defeat Tawakalna Division on 73 Easting	Tawakalna Division reserve Tank battalion	Can counter attack VII Corps units attacking Tawakalna Division
• Small Unit Actions	Breach element of Iraqi defensive line	Iraqi defensive bunker complex	Can defeat breaching attempt with direct fire weapons

Source: MSTP Pamphlet 5-0.2, *Operational Planning Team Leader's Guide* (131)

Centers of Gravity at the Strategic Level. “At the strategic level, a COG could be a military force, an alliance, political or military leaders, a set of critical capabilities or functions, or national will.”⁴⁸ Barfoed sub-divides COGs at this level into two categories: strategic will COGs and strategic ability COGs. Assessing the doctrinal definition, a military force or a set of critical capabilities or functions would be strategic ability COGs, while an alliance, political or military leaders, or national will would be strategic will COGs. In Table 1, the coalition assesses two strategic Iraqi COGs: Saddam Hussein (political/military leader, moral) and the Iraqi Army (military force, physical). Therefore, at the strategic level, the COG can be singular or plural, physical or moral.

Centers of Gravity at the Operational Level. “At the operational level a COG often is associated with the adversary’s military capabilities – such as a powerful element of the armed

forces – but could include other capabilities in the [operational environment].”⁴⁹ MCDP 2, *Intelligence*, provides a case study that uses the 1990-1991 example of Operation Desert Storm to “illustrate the nature of intelligence and its core concepts and challenges.”⁵⁰ This brief analysis captures three operational-level enemy centers of gravity:

1. Command and control, critical for coordination Iraqi defensive effectiveness
2. Weapons of mass destruction, a major factor in Iraq as a regional threat
3. The Republican Guard, key to Iraq’s defense or potential future offensive operations⁵¹

These three examples meet the criteria set forth by JP 2-01.3, in that each is a powerful element of the armed forces and associated with the adversary’s military capabilities. While operational planners and commanders often identify physical COGs, recent experience and doctrinal development demonstrate the importance of moral COGs during counterinsurgency operations:

“[T]he ability to generate and sustain popular support . . . often has the greatest impact on the insurgency’s long-term effectiveness. This ability is usually the insurgency’s center of gravity.”⁵²

Therefore, the support of the populace, or the insurgency’s ability to sustain it, represents “other capabilities” in the operational environment. Table 1 provides a slightly different analysis the same enemy force. Here, the coalition assesses two operational Iraqi COGs: the Republican Guard (powerful element of the armed forces, physical) and the Iraqi Integrated Air Defense System (powerful element of the armed forces, physical). Therefore, at the operational level, the COG can be singular or plural but is typically physical.

Centers of Gravity at the Tactical Level. JP 2-01.3 makes no mention of COGs at the tactical level. With joint doctrine focusing exclusively on COG at the strategic and operational levels, Army doctrine also now reflects a perspective that also potentially excludes the concept from tactical planning: “Not all elements of operational art apply at all levels of warfare. For example, a company commander may be concerned about the tempo of an upcoming operation

but is probably not concerned with an enemies' (sic) center of gravity."⁵³ However, COGs do "exist at each level of warfare."⁵⁴ In Table 1, the coalition assesses three tactical Iraqi COGs: the Iraqi 12th Corps (military unit, physical), the Tawakalna Division reserve tank battalion (military unit, physical), and an Iraqi defensive bunker complex (military facility, physical). Though the analysis represents three tactical COGs, each would be assessed by a coalition unit at a different level. For example, the Iraqi 12th Corps was a COG to the U.S. Army's VII Corps. The Tawakalna Division reserve tank battalion was a COG to the 2nd Armored Division (Forward). Meanwhile, the bunker complex was a COG to the 2d Armored Cavalry Regiment. Each level of command identified enemy COGs that nested within its higher headquarters' tasking and determination of enemy centers of gravity. At the small unit level, squadrons and troops may have identified different enemy COGs tied to their assigned objectives, while platoons and sections likely sought to attack enemy gaps, avoiding direct engagement with identified COGs. Therefore, for any given unit at the tactical level, the COG is typically singular and should be physical.

In 1992, Marine Major Patrick Strain argued against the application of COG at the tactical level. Citing Clausewitz and using Operation Chromite (the September 1950 amphibious assault at Inchon) as his primary example, his analysis focused on the relative capabilities of tactical-level units, tying them to decisive points vice centers of gravity: "A center of gravity is a source of strength. It is not a vulnerability that is easily attacked and destroyed. For each center of gravity there exists vulnerable points that can be attacked, allowing the center of gravity to be indirectly destroyed or neutralized. These points – decisive points – are the focus of tactical level commanders."⁵⁵ However, if decisive points are the focus of tactical commanders, and

decisive points are the “attackable” vulnerabilities of a COG, the tactical commander becomes intrinsically tied to the COG.

Of note, an over-emphasis on the doctrinal allowance for multiple COGs provides an opportunity for a loss of operational focus. In the early 1990s, the United Nations and the U.S. executed Operation Restore Hope in Somalia. Table 2 reflects an operational level COG analysis of the Somali warring factions. This analysis reveals six different factions and twenty different COGs. Since doctrine requires that COGs are tied to objectives, this analysis is of little utility to the commander, who simply cannot obtain focus in that many different directions. “Multiple” COGs should be used sparingly at all levels, and the fewer COGs identified the more easily forces can orient on what is most important.

Table 2: COG Analysis for Operation Restore Hope

Faction Name	Leadership	Center of Gravity
United Somali Congress/ Somali National Alliance	Mohammad Farrah Hassan AIDEED Oman Hassan Ali Atto	<ul style="list-style-type: none"> • Control of Habr Gedir Clan (one of the strongest and most prominent clans in Somalia) • Reputation as a capable Somali general • Access to weapons/resources to maintain clan loyalty
United Somali Congress – Mahdi	Ali MAHDI Mohammad	<ul style="list-style-type: none"> • International Legitimacy • Relationships with UN/NGOs for relief supplies • Access to food/resources for patronage
Somali Patriotic Movement/ Somali National Alliance	Ahmed OMAR JESS	<ul style="list-style-type: none"> • Association with Darood Clan • Reputation as a military leader • Geographical base and access to Port of Kismaayo resources • Alliance with Aideed
Somali Salvation Democratic Front	Abdullahi YUSUF Mohammad ABSHIR Musse	<ul style="list-style-type: none"> • Clan base (Majertain) • Large militia and weapons • Geographical center • Food/Money generated from protection of UN/NGOs
Somali Patriotic Movement – Gabio	Mohammad Siad Hersi MORGAN	<ul style="list-style-type: none"> • Clan base (Ogaden) • Reputation as a Somali General • Geographic region (Kismaayo) • Alliance with Aideed
Somali National Front	Ahmed Warsame Mohammad HASHI	<ul style="list-style-type: none"> • Clan base (Isaaq) • Isolated geographic region (Northwest Somalia)

Source: JP 2-01.3, *Joint Intelligence Preparation of the Operational Environment* (B-13)

Marine Corps Training and Education

The United States Marine Corps Training and Education Command (TECOM) “is charged by the Commandant of the Marine Corps with the development, coordination, resourcing, execution, and evaluation of training and education concepts, policies, plans, and programs to ensure Marines are prepared to meet the challenges of present and future operational environments.”⁵⁶ TECOM operationalizes this mission statement through its six core competencies, listed below (parenthetical references include schools and programs relevant to this paper):

- Transform civilians to Marines, imbued with our Warrior ethos and reflecting the Marine Corps ethics and core values (*Recruit Training*)
- Provide Marines with the initial skills of their assigned Military Occupational Specialty (MOS) to allow them to function in the Operating Forces (*MOS Schools*)
- Provide progressive education and training that will allow Marines to assume increasing responsibilities, and increase their decision making abilities (*Follow-on MOS-specific schools such as Advanced Infantry Training Battalion; Marine Corps University Schools including officer and enlisted Professional Military Education*)
- Enable home station training to ensure the Operating Forces are able to function as MAGTFs in joint environments (*MAGTF Staff Training Program*)
- Develop and execute Service-level training programs and assessments that support the readiness of MAGTFs to deploy in support of missions across the ROMO (*MAGTF Staff Training Program*)
- Identify and establish training in those common skills that are integral to all Marines, regardless of rank or MOS, and ensure that “Every Marine is a rifleman” (*Marine Combat Training, Basic Officer Course*)⁵⁷

Though the TECOM structure accounts for several subordinate units, including directorates for culture, training standards, staff training, etc., its two major subordinate commands are “Training Command” and “Marine Corps University/Education Command.”⁵⁸ Training Command “produces officer and enlisted entry-level Military Occupational Specialty, career progression, and career enhancement skills-trained Marines and Sailors,”⁵⁹ effectively accounting for the entry-level training continuum, including both indoctrination/basic training as well as subsequent and MOS-producing schools. Meanwhile, the Marine Corps University

(MCU) “develops and delivers Professional Military Education and training through resident and distance learning programs,”⁶⁰ providing the sustaining and continuing professional education for officers and Staff Non-Commissioned Officers. While the below list reflects many of the schools under the umbrella of Training and Education Command, the next section of this paper assesses and analyzes the curriculum at those schools marked with an asterisk, primarily the entry-level training continuum for commissioned officers. Included are relevant comments about the other programs.

Training Command

Marine Corps Recruit Training
 School of Infantry
 -Marine Combat Training
 -Infantry Training Battalion
 -Advanced Infantry Training Battalion
 Officer Candidates School*
 The Basic School*
 -Basic Officer Course*/
 Warrant Officer Basic Course*
 -Infantry Officer Course*
 Marine Corps Intelligence Schools*

MCU/Education Command

Staff NCO Career Course
 Staff NCO Advanced Course
 Expeditionary Warfare School
 Command and Staff College
 Marine Corps War College
 MAGTF Staff Training Program*

Officer Candidates School. The Marine Corps Officer Candidates School (OCS) exists “to educate and train officer candidates in Marine Corps knowledge and skills within a controlled and challenging environment in order to evaluate and screen individuals for the leadership, moral, mental, and physical qualities required for commissioning as a Marine Corps officer.”⁶¹ In short, it is a training, evaluation, and screening mechanism used by the Marine Corps prior to offering an individual the opportunity to commission as an officer. OCS professes that it holds officer candidates accountable for actions and to Marine Corps standards while providing a leadership, academic, and physical fitness evaluation.⁶² Academics at OCS provide candidates a very basic exposure to Marine Corps topics such as history, tactics, operations, organization, and land navigation. Primarily residing within the tactics instruction, future officers initially learn

the topic of center of gravity in the “Introduction to Warfighting” class. As a first exposure for most candidates, OCS employs a lengthy and complex definition, verbatim from MCDP 1,

Warfighting:

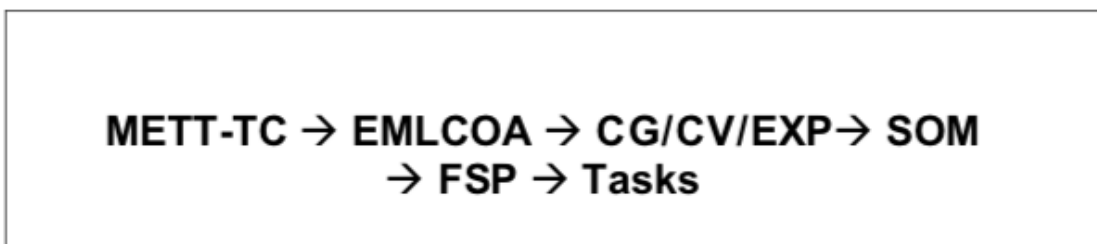
Centers of Gravity (COG). Each belligerent is not a unitary force, but a complex system consisting of numerous physical, moral, and mental components as well as the relationships among them. The combination of these factors determines each belligerent’s unique character. Some of these factors are more important than others. Some may contribute only marginally to the belligerent’s power, and their loss would not cause significant damage. Others may be fundamental sources of capability. We ask ourselves: Which factors are critical to the enemy? Which can the enemy not do without? Which, if eliminated, will bend him most quickly to our will? These are centers of gravity. Depending on the situation, centers of gravity may be tangible or intangible characteristics.”⁶³

There is no subsequent requirement for candidates to apply the concept in planning or in orders development, simply that they “will get more than ample opportunity to practice this at [The Basic School].”⁶⁴ At The Basic School, specifically within the Basic Officer Course (BOC), Lieutenants account for and brief their center of gravity analysis in the “commander’s intent” portion of their operation order. The OCS curriculum identifies commander’s intent as “the part of the order that ties the mission statement and the concept of the operation together (your mission with your plan to accomplish it). At OCS, you will simply state ‘none.’”⁶⁵ This sets up the officer entry-level training continuum to properly instruct and expand on the concept of center of gravity during the BOC and beyond.

The Basic School. The Marine Corps trains its newly commissioned Lieutenants and newly appointed Warrant Officers at The Basic School in Quantico, Virginia, in either its Basic Officer Course (BOC) or Warrant Officer Basic Course (WOBC). For the purposes of this paper, due to near-identical academic curriculum, reference to the BOC includes both the BOC and WOBC. The BOC Program of Instruction encompasses 26 weeks of intense study, practical application, and leadership development and evaluation to provide basically qualified officers

prepared to undertake the rigor of leading Marines as platoon commanders and to continue training in a specific MOS. In the second month of training, instructors introduce the Lieutenants to “tactical planning.” In a series of classes, discussion groups, and sand table exercises, the students learn the basic tenets of estimating a situation, developing a plan, and issuing an operations order. Figure 6 depicts part of this planning continuum as instructed in Quantico.

Figure 6, The Tactical Planning Process



Source: The Basic School, Tactical Planning Process I Student Handout (9)

The above comes from the BOC “Tac Planning” student handout, and demonstrates the sequential analysis, starting with METT-TC (estimate of the situation comprised of mission, enemy, terrain and weather, troops and fire support available, time, and civil considerations). From this, a leader derives the EMLCOA (enemy’s most likely course of action). Based on the METT-TC and EMLCOA, the leader identifies the enemy’s center of gravity and critical vulnerability, and then the friendly plan to exploit the enemy’s critical vulnerability to defeat its center of gravity. Tying back to joint doctrine, the EMLCOA reflects the enemy’s objectives, to which the COG must be tied. The student materials provide the following additional amplification: “[W]e aim to gain an advantage over the enemy through exploitation of a vulnerability. Commanders seek to avoid surfaces and exploit gaps to gain an unfair advantage on the enemy. The careful consideration of enemy Center of Gravity (CG) and Critical Vulnerabilities (CV) is critical to developing the friendly Scheme of Maneuver (SOM).”⁶⁶ The

lesson card continues, defining COG as “the element or capability which allows the enemy to execute his mission.”⁶⁷ This introductory BOC lesson details the following:

- a. *A CG is the answer to the below questions:*
 - i. *Which factors are critical to the enemy?*
 - ii. *Which can the enemy not do without?*
 - iii. *Which, if eliminated, will bend him most quickly to our will?*
- b. *Though an enemy system may have multiple CGs, at the tactical level we focus on one.*
- c. *We want to take away the CG – that source of strength.*⁶⁸

The student handout continues, providing amplification to the critical vulnerability and its relationship to the center of gravity:

2. Critical Vulnerability (CV)

a. Definition: a vulnerability that, if exploited, will do the most significant damage to the enemy’s ability to resist us. It is a pathway to the CG, it is directly related to the center of gravity.

Consideration must be given to a CV as it is the pathway to the enemy’s CG. A CV is something which combat power is applied, at the right time/ right place, utilizing speed and focus to render it ineffective.


*The CG and CV analysis is critical to the development of a plan that directly counters the EMLCOA. If the vulnerability is not targetable at the leader’s level, or the center of gravity is not directly tied to the EMLCOA, his plan will not successfully counter the enemy.*⁶⁹

Similar to the instructional products from OCS, the TBS materials directly reflect MCDP 1, *Warfighting*. As students continue through the Program of Instruction for the BOC, the enemy center of gravity and critical vulnerability become staples in the outputs of tactical planning. Every operation order that a student briefs, whether at the squad level or platoon (reinforced) level, includes a COG/CV analysis and plan for exploitation. It is upon this foundation that Marine officers build a more comprehensive understanding of COG, analysis thereof, and its application.

Infantry Officer Course. Subordinate to the Commanding Officer of The Basic School, the Marine Corps’ Infantry Officer Course (IOC) serves to “train and educate newly selected

infantry and ground intelligence officers in the knowledge, skills, and leadership required to serve as infantry platoon commanders in the rifle company and to provide advanced employment and training considerations of the weapons company platoons.”⁷⁰ This is the MOS-producing school for Marine infantry officers and consists of eleven weeks of mentally and physically rigorous classroom and field training. While the course runs several classes and decision games involving the estimate of the situation and tactical planning, the curriculum makes only brief mention of COG. Figure 7 reflects the actual classroom presentation from the “Combat Orders” class given at IOC. In this, COG (CG in the figure) is included as an element of commander’s intent. Specifically, the instruction reinforces the idea that COG at this level should be something physical; moreover, the curriculum introduces the concept that COG is a function within the enemy system. This course instructs no formal COG analysis, an appropriate approach for new platoon commanders. However, center of gravity and critical vulnerability remain integral to the tactical planning process as introduced during the BOC, and IOC students brief this element of their analysis during the commander’s intent portion of combat orders.

Figure 7: Commander’s Intent



Commander’s Intent

A. Commander’s Intent

1. CG/CV at the platoon level should be something physical/tangible
2. What makes him strong?
3. What makes him weak?
4. The enemy “system.”

B. Exploitation Plan

1. Premise on which you build **YOUR PLAN**
2. How your Marines will WIN
3. Should be connected to your CG/CV analysis
4. Does not need to be complex

Source: “Combat Orders” Class Presentation, USMC Infantry Officer Course (10)

Marine Corps Intelligence Schools. An element of the Marine Corps Training Command, Marine Corps Intelligence Schools (MCIS) serves “to provide command and control and other functions as are necessary for the discipline, morale, and welfare of permanent and student personnel assigned to MCIS Headquarters (HQ) and subordinate detachments. Additionally, MCIS coordinates and integrates training and education requirements for all intelligence occupational fields . . .”⁷¹ In teaching COG, MCIS lays out a “COG Workshop” with multiple classes and six practical applications. Starting with the history of COG, MCIS presents students with a comprehensive background prior to introducing doctrinal and contemporary analysis options. However, MCIS breaks from current doctrine and endorses the Eikmeier Model (also referred to by MCIS as the “MSTP Model”), a contemporary technique. In fact, in its Intelligence Training Enhancement Program, MCIS cites current doctrine in several classes to identify it as “wrong.”⁷² Specifically, MCIS classes state that only one COG exists at each level (does not specify by time or phase), and that a COG must be physical – essentially teaching against the Clausewitzian and doctrinal perspectives of the moral COG.⁷³ Most importantly, however, despite a focused teaching that counters doctrine, MCIS does instruct multiple analysis methods and addresses the pros and cons of each – providing Marine intelligence analysts additional tools from which to select during future operations. For example, MCIS teaches Mansoor and Ulrich’s proposal that the “people are the environment,”⁷⁴ attempting to provide linkage between the doctrinal concept that the COG can be a leader or the population and contemporary assertions that those are simply enablers.

Findings

After a review of historical theory, contemporary analysis, doctrine, and Marine Corps training methodology, this paper yields the following:

Over the past 25 years, joint and service definitions of COG became increasingly consistent. Evolution of doctrine reveals that the joint community took appropriate steps to modernize and synchronize COG. Further, service doctrine proponents continue to update text and definitions with consistent verbiage during routine revisions. While some inconsistencies remain, and each service has its own “take” on COG and how to apply it, the current doctrinal foundation stands to provide clarity and synchronization to the joint force. This does not resolve, nor will it end, the ongoing academic debate about the “true” definition of COG or how the joint force should apply it to each level of war.

Current doctrinal models for COG analysis and application started with modern theorists’ journal publications but remain open to debate. The best example of this is Dr. Joe Strange’s model linking COG to critical vulnerability: $CG \rightarrow CC \rightarrow CR \rightarrow CV$. While Strange’s model is now the baseline in joint doctrine, the elements of COG analysis for each respective service have roots either directly in joint doctrine or from one of the modern theorists. Meanwhile, other analyses such as that by Eikmeier, call for further refinement of the doctrinal application of COG, slightly modifying Strange’s model to $OBJ \rightarrow CC \rightarrow CG \rightarrow CR \rightarrow CV$.

Differing opinions remain (and will...) regarding application of COG at the tactical level of war. Aside from a graphic that carried over from previous editions (Figure 1 above), joint doctrine no longer directly reflects COG at the tactical level. However, the Marine Corps rightfully continues to instruct its company grade officers on the concept, as it is valid and relevant. The research for this paper reveals that formal COG analysis holds little utility below

the battalion level. Companies and platoons should identify an enemy COG, but tactical actions orient more deliberately on perceived critical vulnerabilities – pitting friendly strengths against enemy weaknesses, an oversimplification of maneuver warfare doctrine.

The current Marine Corps training continuum provides a balanced, rank-appropriate model to learn the COG. As this analysis focused on the officer entry-level training continuum, looking specifically at Officer Candidate School, the Basic Officer Course, the Infantry Officer Course, and Marine Corps Intelligence Schools, these findings do not reflect in detail the enlisted training continuum. More research would yield concise recommendations for advanced military occupational specialty courses such as those for squad leaders, section leaders, and platoon sergeants. Additionally, further analysis would yield similar recommendations for enlisted professional military education such as the Staff Non-Commissioned Officer Career Course or Advanced Course. Otherwise, the current approach appears sufficient: introduce the concept in name and definition at OCS; expand and execute basic analysis at TBS; build on the TBS/*Warfighting* model for more complex enemy situations at IOC; and deliberately focus on joint and service doctrine and contemporary non-doctrinal theories at Marine Corps Intelligence Schools.

Opportunities remain for additional synchronization of the definition and application of COG. Starting with MCDP 1, the Marine Corps does not maintain consistency in its doctrinal definitions or analysis models. Logically, each manual will be updated upon the normal life cycles of doctrine: in the joint community, the four-step cycle includes proposal, front end analysis, validation, and program directive development.⁷⁵ Moreover, Marine Corps Order 5600.48C states, “Service doctrine shall be consistent with approved joint doctrine. Any Service doctrine developed that is inconsistent with approved or emerging joint doctrine could cause

unnecessary implications for joint force operations. In such cases, joint doctrine takes precedence.”⁷⁶ This statement serves not to strip service identity from definitions or COG analysis models; rather it speaks to the necessity to nest within the joint doctrinal hierarchy. Not all Marine Corps doctrine and manuals currently nest within the joint definitions and models of COG.

Recommendations

The aforementioned findings reveal a short list of modifications to behavior or doctrine that gain efficiency for the application of COG in contemporary warfare:

For Joint Doctrine: Continue to codify and streamline definitions, analysis models, etc., to reflect the most current and best-validated research and practices. Due to drastic differences in scope and type of mission set, no single solution will fit all services and all missions. However, joint doctrine plays a critical role and will remain effective as the foundation for service doctrine, while also continuing to shape application of COG at the combatant command and joint task force levels. While the Strange Model remains the published joint method for COG analysis, Eikmeier’s proposed refinements provide commanders and staffs a more logical approach to better analyze and identify COGs. Moreover, the vague nature of current doctrine requires a test for COG validation. “A new methodology does not necessarily need to directly mirror Eikmeier’s . . . , but it does need to make joint doctrine COG determination a testable process . . . With qualifying standards, COGs are less likely to be misidentified.”⁷⁷ The CARVER model provides an interim framework for such a test until appropriate research and analysis reveals an improved, COG-specific model for use in doctrine.

For Application in the Marine Corps. Overall, seize opportunities to synchronize center of gravity verbiage and methodology across schools and doctrine. *In training and education,* sustain the current OCS, TBS, and IOC models. At TBS, acknowledge the joint definition of COG to reflect current doctrine but sustain the emphasis on MCDP 1. At MCIS, staff should ensure that instruction reflects current doctrine, whether endorsed or not. Sustain instruction of alternative and contemporary models of COG analysis, but students must leave the schoolhouse reflecting the joint “language” and its relative strengths and weaknesses, not simply that it may not be as good as other models. Sustain instruction on multiple tools for intelligence Marines to employ in the operating forces.

Operationally, the Eikmeier Model provides the Marine Corps the most logical but still appropriately flexible and easily understandable framework for COG analysis. This requires a shift from current joint doctrine. Marine planners should employ this method as a key element of operational design. When leveraged against time, space, and resources available, an Eikmeier Model for COG analysis reveals appropriate critical vulnerabilities that provide clarity to the development of a friendly scheme of maneuver. As recommended above, the Eikmeier model, in conjunction with the CARVER model for COG validation, provides a simple but effective tool most Marine planners already know.

Tactically, the COG concept remains relevant and holds value for Marine leaders. To simplify small unit planning and actions, tactical COGs should be singular by unit and by phase, easily identifiable, and physical. Anything beyond this likely exceeds the ability of a tactical unit to mass or achieve focus, reducing effectiveness. At the small unit level, companies may orient on an enemy COG while their platoons and sections continue to bypass enemy surfaces, seeking to exploit gaps to gain an advantage in time and space.

Doctrinally, the Marine Corps should clarify its approach to COG at each level of war. Reflection on the variances between generations of joint and service doctrine reveals that the Marine Corps last revised MCDP 1, *Warfighting*, in 1997. In this revision, now 21 years past, then-Commandant of the Marine Corps Charles Krulak stated, “*Warfighting* can and should be improved. Military doctrine cannot be allowed to stagnate, especially in an adaptive doctrine like maneuver warfare. Doctrine must continue to evolve based on growing experience, advancements in theory, and the changing face of war itself.”⁷⁸ In this spirit, it is time for the Marine Corps to review and revise MCDP 1, incorporating theory derived from the longest war in U.S. history. Beyond *Warfighting*, the Marine Corps should update other warfighting and reference publications and pamphlets to reflect the Eikmeier – CARVER Model for COG analysis and validation. MCIS already adopted Eikmeier, and MSTP materials already reflect the same. If the joint staff preserves the Strange Model as doctrine, the Marine Corps must acknowledge that while providing an appropriate alternative. Codifying this technique in doctrine synchronizes the force with a more effective construct.

¹ Headquarters US Marine Corps, *Marine Corps Operating Concept (MOC): How an Expeditionary Force Operates in the 21st Century* (Washington, DC: Headquarters US Marine Corps, September 2016), 1.

² Jacob Barfoed, “A COG Concept for Winning More Than Just Battles,” *Joint Force Quarterly* 88 (1st Quarter 2018): 117, http://ndupress.ndu.edu/Portals/68/Documents/jfq/jfq-88/jfq-88_116-123_Barfoed.pdf?ver=2018-01-09-102343-880.

³ Carl von Clausewitz, *On War*, eds. Michael Howard and Peter Paret, trans. Michael Howard and Peter Paret (Princeton: Princeton University Press, 1984), 485.

⁴ *Ibid.*, 486.

⁵ *Ibid.*, 595.

⁶ *Ibid.*, 596.

⁷ Joe Strange and Richard Iron, “Understanding Centers of Gravity and Critical Vulnerabilities,” Part 1, <http://www.au.af.mil/au/awc/awcgate/usmc/cog1.pdf>, 2.

⁸ *Ibid.*, 3.

⁹ *Ibid.*, 4.

¹⁰ Peter Paret, ed., *Makers of Modern Strategy from Machiavelli to the Nuclear Age* (Princeton: Princeton University Press, 1986), 165-167.

-
- ¹¹ Ibid., 178.
- ¹² De Baron Jomini, *The Art of War* trans. G. H. Mendell and W. P. Craighill (Westport, CT: Greenwood Press, 1971), 47.
- ¹³ Ibid., 47-48.
- ¹⁴ Strange and Iron, “Understanding Centers of Gravity and Critical Vulnerabilities,” Part 1, 10.
- ¹⁵ US Department of Defense, *Joint Intelligence Preparation of the Operational Environment*, JP 2-01.3 (Washington, DC: The Joint Staff, May 21, 2014): IV-12.
- ¹⁶ Dale C. Eikmeier, “Redefining the Center of Gravity,” *Joint Forces Quarterly* 59 (4th Quarter, 2010): 156, http://www.au.af.mil/au/awc/awcgate/jfq/eikmeier_redefine_cog.pdf.
- ¹⁷ Ibid.
- ¹⁸ Ibid., 158.
- ¹⁹ Ibid., 157.
- ²⁰ Rick Rowlett, “Joint Publication 3-0, *Joint Operations*,” *Joint Force Quarterly* 86 (3rd Quarter 2017): 122, http://ndupress.ndu.edu/Portals/68/Documents/jfq/jfq-86/jfq-86_122-123_Rowlett.pdf.
- ²¹ US Department of Defense, *Doctrine for Joint Operations*, JP 3-0 (Washington, DC: The Joint Staff, February 1, 1995): GL-4, https://www.globalsecurity.org/military/library/policy/dod/joint/jp3_0_1995.pdf.
- ²² US Department of Defense, *Joint Planning*, JP 5-0 (Washington, DC: The Joint Staff, June 16, 2017): xxii.
- ²³ US Department of Defense, *Joint Planning*, JP 5-0 (Washington, DC: The Joint Staff, December 26, 2006): IV-8.
- ²⁴ US Department of Defense, *Joint Planning*, June 16, 2017, IV-26.
- ²⁵ Headquarters US Marine Corps, *Strategy*, MCDP 1-1 (Washington, DC: Headquarters US Marine Corps, November 12, 1997), 86.
- ²⁶ Headquarters US Marine Corps, *Warfighting*, MCDP 1 (Washington, DC: Headquarters US Marine Corps, June 20, 1997), 46.
- ²⁷ Headquarters US Marine Corps, *Warfighting*, FMFM 1 (Washington, DC: Headquarters US Marine Corps, March 6, 1989), 85.
- ²⁸ Robert Dixon, “Clausewitz, Center of Gravity, and the Confusion of a Generation of Planners,” accessed April 4, 2018, <http://smallwarsjournal.com/jrnl/art/clausewitz-center-of-gravity-and-the-confusion-of-a-generation-of-planners>.
- ²⁹ Office of the Chief of Naval Operations, *Navy Planning*, NWP 5-01 (Norfolk, VA: Navy Warfare Development Command, December, 2013), C-3.
- ³⁰ Office of the Chief of Naval Operations, *Navy Planning*, C-2.
- ³¹ Headquarters, Department of the Army, *Operations*, ADRP 3-0 (Washington, DC: Headquarters, Department of the Army, November 11, 2016), 2-4.
- ³² Ibid.
- ³³ Ibid., 2-5.
- ³⁴ Lemay Center for Doctrine, *Operations and Planning*, Annex 3-0, November 4, 2016: App. A, <http://www.doctrine.af.mil/Doctrine-Annexes/Annex-3-0-Operations-and-Planning/>.
- ³⁵ Ibid.
- ³⁶ US Department of Defense, *Joint Intelligence Preparation of the Operational Environment*, IV-11.
- ³⁷ Ibid., IV-12.

-
- ³⁸ Lemay Center for Doctrine, *Operations and Planning*, App. A.
- ³⁹ Ibid.
- ⁴⁰ Ibid.
- ⁴¹ Ibid.
- ⁴² Ibid.
- ⁴³ US Department of Defense, *Joint Tactics, Techniques, and Procedures for Special Operations Targeting and Mission Planning*, JP 3-05.2 (Washington, DC: The Joint Staff, May 21, 2014): A-2.
- ⁴⁴ Headquarters US Marine Corps, *Marine Corps Planning Process*, MCWP 5-10 (Washington, DC: Headquarters US Marine Corps, May 2, 2016), 3-1.
- ⁴⁵ US Department of Defense, *Joint Planning* (June 16, 2017), IV-24.
- ⁴⁶ US Department of Defense, *Joint Intelligence Preparation of the Operational Environment*, IV-10.
- ⁴⁷ Ibid., IV-11.
- ⁴⁸ Ibid., IV-10.
- ⁴⁹ Ibid.
- ⁵⁰ Headquarters US Marine Corps, *Intelligence*, MCDP 2 (Washington, DC: Headquarters US Marine Corps, June 7, 1997), 21.
- ⁵¹ Ibid., 22.
- ⁵² Headquarters, Department of the Army, *Counterinsurgency*, FM 3-24/MCWP 3-33.5, (Washington, DC: December, 2006), 3-13.
- ⁵³ Headquarters, Department of the Army, *Operations*, 2-4.
- ⁵⁴ US Department of Defense, *Joint Planning*, June 16, 2017, IV-24.
- ⁵⁵ Patrick Strain, "The Tactical Center of Gravity: Fact or Fallacy," Master's Thesis, School of Advanced Military Studies, 1992: 39. <http://www.dtic.mil/dtic/tr/fulltext/u2/a264508.pdf>.
- ⁵⁶ United States Marine Corps, "TECOM Training and Education Command," *United States Marine Corps*, accessed February 21, 2018, <http://www.tecom.marines.mil/About/>.
- ⁵⁷ Ibid.
- ⁵⁸ Ibid.
- ⁵⁹ United States Marine Corps, "Training Command," *United States Marine Corps*, accessed February 21, 2018, <http://www.trngcmd.marines.mil>.
- ⁶⁰ Marine Corps University, "Vision Statement," *Marine Corps University*, accessed February 21, 2018, <https://www.usmcu.edu/about-us/vision-statement>.
- ⁶¹ United States Marine Corps, "Officer Candidates School," *United States Marine Corps*, accessed February 22, 2018, <http://www.trngcmd.marines.mil/Units/Northeast/Officer-Candidates-School/>.
- ⁶² Ibid.
- ⁶³ Officer Candidates School, "Introduction to Warfighting, LDR 1033LP, Student Handout" (Quantico, VA: Training Command, August, 2016): 4.
- ⁶⁴ Ibid., 5.
- ⁶⁵ Officer Candidates School, "The Operation Order Part 2 - BAMCIS, TACT 1015, Lesson Card" (Quantico, VA: Training Command, August, 2016): 3.
- ⁶⁶ The Basic School, "Tactical Planning Process I, B2B0255XQ, Student Handout" (Quantico, VA): 18, <http://www.trngcmd.marines.mil/Portals/207/Docs/TBS/B2B0255XQ%20Tactical%20Planning%20Process%20I.pdf?ver=2017-01-27-145738-293>.
- ⁶⁷ Ibid.

⁶⁸ Ibid.

⁶⁹ Ibid.

⁷⁰ “Marine Corps Infantry Officer Course – Quantico, VA,” *Defense Visual Information Distribution Service*, accessed May 3, 2018, <https://www.dvidshub.net/feature/IOC>.

⁷¹ United States Marine Corps, “Marine Corps Intelligence Schools,” *United States Marine Corps*, accessed February 22, 2018, <http://www.trngcmd.marines.mil/Units/Northeast/MCIS/AboutUs/>.

⁷² Marine Corps Intelligence Schools, “The Counterinsurgency COG,” *United States Marine Corps*, PowerPoint Presentation.

⁷³ Marine Corps Intelligence Schools, “COG Analysis: The Eikmeier Method,” *United States Marine Corps*, PowerPoint Presentation.

⁷⁴ Peter Mansoor and Mark Ulrich, “Linking Doctrine to Action: A New COIN Center-of-Gravity Analysis,” *Military Review* (Sep-Oct 2007): 46, <http://www.dtic.mil/dtic/tr/fulltext/u2/a486842.pdf>.

⁷⁵ Chairman of the Joint Chiefs of Staff, *Joint Doctrine Development Process*, CJCSM 5120.01A, December 29, 2014, B-6.

⁷⁶ Commandant of the Marine Corps, *U.S. Marine Corps Procedures for Participation in the Development of Joint Doctrine and NATO Allied Joint Doctrine*, MCO 5600.48C, September 19, 2016, 6.

⁷⁷ Daniel J. Smith, Kelley Jeter, and Odin Westgaard, “Three Approaches to Center of Gravity Analysis,” *Joint Force Quarterly* 78 (3rd Quarter, 2015), 135.

⁷⁸ Headquarters US Marine Corps, *Warfighting*, Foreward.

Bibliography

- Barfoed, Jacob. "A COG Concept for Winning More Than Just Battles." *Joint Force Quarterly* 88 (1st Quarter 2018): 116-123, http://ndupress.ndu.edu/Portals/68/Documents/jfq/jfq-88/jfq-88_116-123_Barfoed.pdf?ver=2018-01-09-102343-880.
- Clausewitz, Carl von. *On War*. Edited by Michael Howard and Peter Paret. Translated by Michael Howard and Peter Paret. Princeton: Princeton University Press, 1984.
- Chairman of the Joint Chiefs of Staff. *Joint Doctrine Development Process*. CJCSM 5120.01A. December 29, 2014.
- Commandant of the Marine Corps. *U.S. Marine Corps Procedures for Participation in the Development of Joint Doctrine and NATO Allied Joint Doctrine*. MCO 5600.48C. September 19, 2016.
- Dixon, Robert. "Clausewitz, Center of Gravity, and the Confusion of a Generation of Planners." Accessed April 4, 2018. <http://smallwarsjournal.com/jrnl/art/clausewitz-center-of-gravity-and-the-confusion-of-a-generation-of-planners>.
- Eikmeier, Dale C. "Let's Fix or Kill the Center of Gravity Concept." *Joint Force Quarterly* 83 (4th Quarter, 2016). <http://ndupress.ndu.edu/Media/News/Article/969689/lets-fix-or-kill-the-center-of-gravity-concept/>.
- Eikmeier, Dale C. "Redefining the Center of Gravity." *Joint Force Quarterly* 59 (4th Quarter, 2010): 156-158. http://www.au.af.mil/au/awc/awcgate/jfq/eikmeier_redefine_cog.pdf.
- Hemming, Lee W. "Center of Gravity Analysis: The Marine Corps Planning Process Needs to Catch Up." Master's Thesis. USMC Command and Staff College, September 4, 2013.
- Headquarters, Department of the Army. *Counterinsurgency*, FM 3-24/MCWP 3-33.5. Washington, DC: December, 2006.
- Headquarters, Department of the Army. *Operations*. ADRP 3-0. Washington, DC: Headquarters, Department of the Army, November 11, 2016.
- Headquarters US Marine Corps. *Intelligence*. MCDP 2. Washington, DC: Headquarters U.S. Marine Corps, June 7, 1997.
- Headquarters US Marine Corps. *Marine Corps Operating Concept (MOC): How an Expeditionary Force Operates in the 21st Century*. Washington, DC: Headquarters US Marine Corps, September, 2016.
- Headquarters US Marine Corps. *Marine Corps Planning Process*. MCWP 5-10. Washington, DC: Headquarters US Marine Corps, May 2, 2016.

- Headquarters US Marine Corps. *Strategy*. MCDP 1-1. Washington, DC: Headquarters U.S. Marine Corps, November 12, 1997.
- Headquarters US Marine Corps. *Warfighting*. FMFM 1. Washington, DC: Headquarters U.S. Marine Corps, March 6, 1989.
- Headquarters US Marine Corps. *Warfighting*. MCDP 1. Washington, DC: Headquarters U.S. Marine Corps, June 20, 1997.
- Infantry Officer Course. "Combat Orders." PowerPoint Presentation. Quantico, VA: The Basic School.
- Jomini, De Baron. *The Art of War*. Translated by G. H. Mendell and W. P. Craighill. Westport, CT: Greenwood Press, 1971.
- Lemay Center for Doctrine. *Operations and Planning*. Annex 3-0, November 4, 2016, <http://www.doctrine.af.mil/Doctrine-Annexes/Annex-3-0-Operations-and-Planning/>.
- Mansoor, Peter and Mark Ulrich. "Linking Doctrine to Action: A New COIN Center-of-Gravity Analysis." *Military Review* (Sep-Oct 2007): 45-51, <http://www.dtic.mil/dtic/tr/fulltext/u2/a486842.pdf>.
- Office of the Chief of Naval Operations. *Navy Planning*. NWP 5-01. Norfolk, VA: Navy Warfare Development Command, December, 2013.
- Officer Candidates School. "Introduction to Warfighting, LDR 1033LP, Student Handout." Quantico, VA: Training Command, August, 2016.
- Officer Candidates School. "The Operation Order Part 2 - BAMCIS, TACT 1015, Lesson Card." Quantico, VA: Training Command, August, 2016.
- Paret, Peter, ed. *Makers of Modern Strategy from Machiavelli to the Nuclear Age*. Princeton: Princeton University Press, 1986.
- Rowlett, Rick. "Joint Publication 3-0, *Joint Operations*." *Joint Force Quarterly* 86 (3rd Quarter 2017): 122-123, http://ndupress.ndu.edu/Portals/68/Documents/jfq/jfq-86/jfq-86_122-123_Rowlett.pdf.
- Schnieder, James J. and Lawrence Izzo. "Clausewitz's Elusive Center of Gravity." *Parameters*, September, 1987, 46-57. <http://stinet.dtic.mil/>.
- Smith, Daniel J., Kelley Jeter, and Odin Westgaard. "Three Approaches to Center of Gravity Analysis." *Joint Force Quarterly* 78 (3rd Quarter, 2015): 129-136.
- Strain, Patrick. "The Tactical Center of Gravity: Fact or Fallacy." Master's Thesis, School of Advanced Military Studies, 1992. <http://www.dtic.mil/dtic/tr/fulltext/u2/a264508.pdf>.

Strange, Joe and Richard Iron. "Understanding Centers of Gravity and Critical Vulnerabilities," Part 1. <http://www.au.af.mil/au/awc/awcgate/usmc/cog1.pdf>.

Strange, Joe and Richard Iron. "Understanding Centers of Gravity and Critical Vulnerabilities," Part 2. <http://www.au.af.mil/au/awc/awcgate/usmc/cog2.pdf>.

The Basic School. "Tactical Planning Process I, B2B0255XQ, Student Handout." Quantico, VA. <http://www.trngcmd.marines.mil/Portals/207/Docs/TBS/B2B0255XQ%20Tactical%20Planning%20Process%20I.pdf?ver=2017-01-27-145738-293>.

US Department of Defense. *Doctrine for Joint Operations*, JP 3-0. Washington, DC: The Joint Staff, February 1, 1995. https://www.globalsecurity.org/military/library/policy/dod/joint/jp3_0_1995.pdf.

US Department of Defense. *Joint Intelligence Preparation of the Operational Environment*, JP 2-01.3. Washington, DC: The Joint Staff, May 21, 2014.

US Department of Defense. *Joint Operations*. JP 3-0. Washington, DC: The Joint Staff, January 17, 2017.

US Department of Defense. *Joint Planning*, JP 5-0. Washington, DC: The Joint Staff, December 26, 2006. http://www.bits.de/NRANEU/others/jp-doctrine/jp5_0%2806%29.pdf.

US Department of Defense. *Joint Planning*, JP 5-0. Washington, DC: The Joint Staff, June 16, 2017.

US Department of Defense. *Joint Tactics, Techniques, and Procedures for Special Operations \ Targeting and Mission Planning*. JP 3-05.2. Washington, DC: The Joint Staff, May 21, 2014.