1st Combat Camera Squadron (Jeremy T. Lock)

Center of Gravity
Recommendations for Joint Doctrine

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Advanced by Carl von Clausewitz, the concept of center of gravity is a popular strategic theory. Military transformation assigns a dominant role in doctrine to this concept despite its roots in the industrial age.

Yet after more than two decades of controversy, the meaning of center of gravity remains unsettled. Fortunately, some of the confusion can be eliminated by returning to its original sense. Both the concept and its analogue in the mechanical sciences have common properties: neither is a source of strength, but rather a point at which physical and psychological forces meet. As a result, doctrine should be revised—in particular, Joint Pub 3-0, *Doctrine for Joint Operations,*

and Joint Pub 5-00.1, *Joint Doctrine for Campaign Planning*, to establish a clear understanding of the meaning of center of gravity.

Joint Doctrine

Each service has applied the concept of center of gravity differently. The Army and Navy typically thought in terms of a single center of gravity, which resided at the core of landpower or seapower and provided the source of physical and psychological capacity to fight. The Air Force, on the other hand, envisioned multiple centers, each targeted from the air to paralyze an enemy. The Marine Corps, which conducts forcible entry operations, has long regarded center of gravity as a critical vulnerability. Thus the concept has assumed many guises over the years.

In the mid-1990s the military attempted to consolidate individual service perspectives into a single definition that asserts that the essence of the operational art resides in massing effects against enemy sources of power—centers of gravity—to gain a decisive advantage. Joint Pub 3-0 defined centers as "characteristics, capabilities, or locations from which a military force derives its freedom of action, physical strength, or will to fight." It also implied that centers exist for every level and type of war. Presumably, defeating

Stryker brigade at National Training Center.

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tactical centers facilitates tactical objectives that contribute to the defeat of operational centers and assist in

Joint Pub 5-00.1 stresses the importance of linking centers to *critical vulnerabilities*

achieving operational objectives and so on until national security objectives are reached. On the strategic level, centers might include military forces, allies, national will, critical capabilities, or national strategy. On the operational and tactical levels, they would generally consist of principal sources of combat power such as modern, mobile, or armored forces that can assure or prevent mission accomplishment. In other words, Joint Pub 3-0 strove for consensus by drawing together service predilections. In doing so, however, it defined centers broadly and offered no method for determining them.

Joint Pub 5-00.1, which appeared in January 2002, builds on Joint Pub 3-0 and provides a general method for determining centers of gravity. It defines the concept like Joint Pub 3-0, except that *locations* is replaced by *sources of strength*. In addition, it states that centers consist of "those aspects of the adversary's *overall capability* that, theoretically, if attacked and neutralized or destroyed will lead either to the adversary's inevitable defeat or force opponents to abandon aims or change behavior." Thus it is a capabilities-based definition that is derived from the sum of enemy capabilities despite terms such as *characteristics* and *sources of power*. Moreover, Joint Pub 5-00.1 stresses the importance of linking centers to *critical vulnerabilities*, enabling an attack through weak points in the overall system. Similar to the approach adopted by the Marine Corps, centers of gravity and critical vulnerabilities

Washington at Princeton.

Painted by D. McLellan (DVIC/NARA)

Recommendations for Joint Doctrine

■ To align the definition of center of gravity with the Clausewitzian concept and bring it back under control, doctrine in general and Joint Pubs 3-0 and 5-00.1 in particular should redefine it as focal point—the element with centripetal force to hold everything together and provide raw power, purpose, and direction.

■ Planners should refrain from applying the concept to every kind of war or operation to reduce competition with political-military objectives. We must ask whether the total military collapse of an enemy is commensurate with our political objectives and endstate.

■ If total collapse is desired, planners should identify the connections and gaps in an entire enemy structure or system before deciding whether a center of gravity exists. The concept does not apply where the enemy is not connected enough to act with unity. Also, given the anticipated proliferation of chemical, biological, radiological, nuclear, and high-explosive weapons, there could be times when it is dangerous to assume that individual enemy segments can be defeated by a single knockout blow. If several al Qaeda cells were armed with such weapons, for instance, striking one could trigger massive retaliation. Continued proliferation and information technologies could make the concept of center of gravity academic in the future.

■ Employing the concept means learning to think more about the desired effects and less about capabilities to be destroyed, all without denigrating the importance of those capabilities.

■ Centers of gravity can change during a conflict if, for example, allies enter or leave the fight, or other changes occur within the combatants' power structures. We must therefore reassess any previous determination of a center. We should reevaluate whether we need to attack centers that are so transitory they can quickly be replaced. Perhaps we have only found a center of critical capability.

■ Resist dissecting an enemy into tactical, operational, and strategic centers of gravity. Efforts and intermediate objectives should largely be focused on destroying the center. Creating subunits is artificial unless an enemy is too dispersed or decentralized to have a dominant center of gravity. Then it may be possible to trace individual centers to a central one.   **JFQ**

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are regarded as different but complementary ideas. Identifying the latter will focus efforts on something that can achieve decisive results. Critical vulnerabilities will provide knowledge on attacking centers of gravity, but as one military analyst explained, using this concept in planning "leads you to see very quickly that some vulnerabilities are interesting but a waste of resources because they do not lead anywhere useful in the end."[1]

The process described in Joint Pub 5-00.1 does not lead to center of gravity, but rather to a set of critical capabilities. It seems to rely on an approach developed by Joseph Strange, who concluded that service definitions lacked precision and tended to equate centers of gravity with physical vulnerabilities or strengths without enough attention to psychological centers of power.[2] To redress that notion, Strange redefined centers as "dynamic agents of action or influence," as specific "moral, political, and physical entities that *possess* certain characteristics and capabilities, or benefit from a given location/terrain." Moreover, he defined

centers of gravity in relationship to capabilities, requirements, and vulnerabilities. Key combat forces, for example, may be centers if they possess critical capabilities. Those capabilities—to shoot, move, and communicate—have critical requirements such as open lines of communication that enable them to continue operating. A requirement that is inadequately protected—such as enemy lines of communication near Inchon during the Korean War—constitutes a critical vulnerability. Neutralizing critical vulnerabilities would contribute to defeating the enemy center of gravity.

Strange links centers of gravity to critical vulnerabilities in a way that war planners can put into practice. However, since any number of "dynamic agents of action or influence" can exist in a given battlespace, his approach does not focus resources on elements that will prove decisive. His methodology lacks criteria for determining what makes one dynamic agent more important than another. Moreover, since he does not build on the Clausewitzian definition, in which center of gravity serves as a focal point, his interpretation is capabilities-based and tautological. In fact,

centers for Strange are important because of their critical capabilities. Although this approach can link critical strengths or capabilities to critical vulnerabilities, it will bring planners to an actual enemy center of gravity as opposed to a center of critical capability only by coincidence.

The definition in Joint Pub 5-00.1 and its approach to determining centers of gravity thus begs the question: Why not just call centers of critical capabilities what they are?—critical centers or critical points. Although identifying enemy centers of critical capabilities can be useful, as will be seen in the definition by Clausewitz, an enemy might not have a center—at least not one that can be attacked. In those cases one should focus on destroying critical capabilities. It stands to reason that neutralizing them will eventually lead to accomplishing objectives.

The Clausewitzian Concept

The Prussian philosopher of war apparently derived his concept of center of gravity in part from Paul Erman,

Guided missile cruisers.

U.S. Navy (Daniel J. McLain)

a physicist who taught at the University of Berlin and *Allgemeine Kriegsschule* (war college). Clausewitz was director of the latter institution from 1818 to 1830 and exchanged ideas on the mechanical sciences with Erman.

For Clausewitz and his contemporaries, center of gravity represented the point where the forces of gravity converge within an object in the context of modern elementary physics. Striking an object with enough force will usually cause it to lose its equilibrium and

fall. Center of gravity is therefore not a source of strength but a factor of balance. The strength of an infantryman, for example, can be attributed to his muscles, brains, or weapons in any combination, but it relates to center of gravity only so far as he needs to be balanced to use them. Conversely, a soldier might be physically frail, intellectually challenged, or lack for weaponry, but these conditions have little effect on his equilibrium. Strictly speaking, a center is neither a strength nor a weakness, though striking it can compromise the former or exploit the

latter. Directing a blow with enough force against the center of gravity of an infantryman could lay him low regardless of his strengths and weaknesses because this center is connected to his physical characteristics.

Most definitions of the concept of center of gravity are based on the

center of gravity connects various strengths of the soldier without being a strength itself

translation of *On War* by Michael Howard and Peter Paret, especially book six (Defense) and book eight (War Plans). It is "always found where the mass is concentrated most densely," serves as "the hub of all power and movement, on which everything depends," and emerges from the "dominant characteristics of both belligerents."[3] Unfortunately, this version creates a false impression that centers of gravity are akin to sources of strength:

The first principle is that the ultimate substance of enemy strength must be traced back to the fewest possible sources, and ideally to one alone. The attack on these sources must be compressed into the fewest possible actions—again, ideally, into one. . . . The task of reducing the sources of enemy strength to a single center of gravity will depend on: 1) the distribution of the enemy's political power . . . 2) the situation in the theater of war where the various armies are operating.[4]

A closer look at the German original reveals that Clausewitz never used source (*Quelle*). Instead he advised tracing the full weight (*Gewicht*) of an enemy force (*Macht*) to as few centers of gravity as possible. Like the example of physics, center of gravity connects various strengths of the soldier without being a strength itself. A more literal translation is:

. . . to trace the full weight [Gewicht] *of the enemy's force* [Macht] *to as few centers of gravity as possible, when feasible, to one; and, at the same time, to reduce the blow against these centers of gravity to as few major actions as possible, when feasible, to one. . . .*

Amphibious assault vehicles.

Fleet Combat Camera, Atlantic (Brien Aho)

Battle of New Orleans.

Lithograph by Kurz and Allison (DVIC/NARA)

Reducing the enemy's force to one center of gravity depends, first, upon the [enemy's] political connectivity [or unity] itself . . . and, second, upon the situation in the theater of war itself, and which of the various enemy armies appear there.[5]

Enemy Cohesion

References to center of gravity in the text indicate that the concept remains valid only when an enemy has sufficient unity or interdependence (*Zusammenhang*) to act as a single body.

Just as the center of gravity is always found where the mass is most concentrated, and just as every blow directed against the body's center of gravity yields the greatest effect, and—more to the point—the strongest blow is the one delivered by the center of gravity, the same is true in war. The armed forces of every combatant, whether an individual state or an alliance of states, have a certain unity and thus a certain interdependence [or connectivity—Zusammenhang]; and where such interdependence exists, one

can apply the concept. Accordingly, there exist within these forces certain centers of gravity which, by their movement and direction, exert a decisive influence over all other points; and they exist where the forces are most concentrated. However, just as in the world of inanimate bodies where the effect on a center of gravity has its proportions and limits determined by the interdependence of the parts, the same is true in war.[6]

In other words, before applying the concept to war planning, one must determine whether an enemy will act as a single entity. If so, we should look for connections among its parts to discover what holds them together. In 1809, for example, Napoleon had to fight on two fronts: against Anglo-Spanish forces in Spain and the Austrians in Central Europe. Although they had a common enemy, the Anglo-Spanish and Austrians did little to coordinate their efforts. Hence it would have been correct for Napoleon to look for two centers of gravity, one on each front. As Clausewitz stated, the degree of unity formed by forces and the geographical spaces in which they have to fight can create more than one center. He advocated tracing multiple centers of gravity back to a single one. Yet he allowed that a lone center of gravity might not exist. The key question,

then, is whether enemy forces are connected sufficiently so actions against them in one area will have a decisive effect in other areas.

Second, center of gravity refers to an element that holds enemy forces together or, in other words, serves as a focal point. Indeed, this becomes clear in a popular passage from book eight which actually described center of gravity as it applies to war plans:

What theory can admit to thus far is the following: Everything depends upon keeping the dominant characteristics of both states in mind. From these emerge a certain center of gravity, a focal point [Zentrum] *of force and movement, upon which the larger whole depends; and, it is against the enemy's center of gravity that the collective blow of all power must be directed.*[7]

To find a center in any particular situation, one must look for whatever provides an enemy with a certain centripetal (center-seeking) force as opposed to centrifugal force, which is outward-seeking. Clausewitz pointed out that in the campaign against France in 1814, the allied center of gravity lay more with the Prussians under Field Marshal Blücher than the Austrians under Prince Schwarzenberg. Blücher, "although weaker than Schwarzenberg [100,000 versus 140,000], was nonetheless the more important adversary due to his enterprising spirit; hence, the center of gravity lay more with him and it pulled the others in his direction."[8] In the actual campaign, Napoleon (with 75,000 men) defeated the Prussians, then turned on the Austrians and drove them back. Nonetheless, Blücher and Schwarzenberg recovered and bested Bonaparte a month later. Clausewitz argued that Napoleon should have pursued and crushed Blücher—the allied center. Such a victory would have induced the Austrians to withdraw. Like mechanical sciences, military centers have a centripetal quality; they represent a focal point where forces come together.

Clausewitz provided several examples of focal points. The centers of gravity of Alexander the Great, Gustavus Adolphus, Charles XII of Sweden, and Frederick the Great rested with their armies. Under different circumstances, the personalities of leaders, capital, or network of allies and their community of interests might fill that function. What these elements share in common is not that they are sources of power; rather they perform a centripetal function that holds systems of power together and in some cases provides direction. But military force is not strictly a source of power. Rather, it is a focal point for drawing power from various sources: population (recruits), industry (weapons and matériel), and agriculture (food). The same holds true for the personalities of leaders, capital, or alliance networks, which draw raw power and then refine and redirect it.

Cause and Effect

Center of gravity focuses on achieving a specific effect: collapse of an enemy. Hence it is an effects-based rather than capabilities-based approach. These approaches are linked. Attacking specific capabilities produces certain effects. Achieving them often requires attacking specific capabilities. Indeed, one could say that these approaches represent two sides of the same coin. In the capabilities-based approach, the first step is identifying key enemy strength that could prevent one from achieving his objective. In the effects-based approach, the first step is identifying the desired effect and determining what actions are needed. Frequently such actions might go beyond neutralizing or destroying specific capabilities. The capabilities-based approach seeks a negative aim, destroying a capability. The effects-based approach pursues a positive aim, creating a certain effect. The Armed Forces have gotten into the habit of narrowly focusing on the former but could benefit from the broader approach of the latter.

In one sense, the Clausewitzian effects-based center of gravity resembles an emerging concept known as effects-based operations more than the current capabilities-based notion, with the exception that only one particular effect is sought—total collapse of an enemy. For Clausewitz, the effect and the objective—total collapse—were always the same. Effects-based operations have the benefit of forcing political and military leaders to focus on the specific effects they want military and nonmilitary action to achieve.

Like effects-based operations, center of gravity requires the ability to reasonably predict how to achieve at least first- and second-order effects and possibly more. Yet the Prussian considered the calculation of a center of gravity a matter of "strategic judgment" on the

Marching into Mexico City.

Painting by Tom Lovell (DVIC/NARA)

highest levels. Given his distaste for prescriptive formulae, it is doubtful he would have approved of current efforts to make such calculations by means of information technology and software. On the other hand, he would certainly have supported educating leaders to develop their strategic judgment in order to make such determinations. That theme runs throughout *On War*.

Moreover, Clausewitz did not distinguish between tactical, operational, or strategic centers of gravity. Center is

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defined in terms of the entire system or structure of an enemy, not by a level of war. A soldier can have only one at a time. Accordingly, a local commander might determine a center for enemy forces directly opposing him, providing that the forces are sufficiently removed from their comrades. However, this separate center would only be local rather than either tactical or operational. To isolate such a center, levels of war would have to exist independently. Using the concept of center

of gravity should have a unifying effect on tactical, operational, and strategic efforts. Dividing centers of gravity into tactical, operational, and strategic elements only leads to centers of critical capability.

Clausewitz emphasized that centers of gravity should only be sought in wars designed to defeat an enemy completely. Only vast energy and resources aimed at decisive victory cause such centers and their areas of influence to emerge. In such wars, military and political objectives—the total political and military defeat of an enemy—essentially complement each other. To achieve the total collapse of an enemy, one should strike at its center. In limited wars, on the other hand, centers compete with the typically more restricted political objectives. For example, the ground component planning staff of U.S. Central Command spent more effort in trying to identify the Iraqi center of gravity during the Persian Gulf War than planning its defeat. Ironically, under the Clausewitz concept, that determination would have been unnecessary since Desert Storm was not a war of annihilation. Simply

translating strategic objectives—the expulsion of Iraq from Kuwait and reduction of enemy offensive capabilities—into operational and tactical objectives should have given Coalition forces all the necessary operational guidance. This is not to say that the concept only applies in wars of annihilation; but it is neither appropriate nor necessary in all cases.

Determining Centers

Defining center of gravity is only half of the battle. Planners must find a practical way to determine the center for specific enemies. The method should be simple, in keeping with the Clausewitzian dictum that in war even the simplest thing is difficult; yet it should use the best intelligence available and accommodate revision as the result of rigorous analysis.

Determine whether identifying and attacking a center of gravity is appropriate for the war being waged. The campaign against al Qaeda, though part of the larger global war on terrorism, is essentially a conflict that cannot end without neutralizing or destroying that group; hence the identification and pursuit of center of gravity serves a constructive purpose.

Determine whether the enemy structure or system is sufficiently connected to be treated as a single body. Al Qaeda has numerous cells globally, and most do not know the others exist. Some of these cells or individuals within them appear to have been linked to group leadership by networked electronic communications. Messages and commands were thus passed via the Internet, cellular phones, and other electronic devices. It is also possible that some cells have orders and will attempt to execute them at a certain time and place if they receive no guidance to the contrary. Thus the physical links are intermittent at best. Successful operations against cells in Europe will not likely cause those in Singapore to collapse. The group's psychological links appear strong. If cells are not well linked physically, they have strong ideological ties. Perhaps we should seek an ideological center of gravity.

Determine what element has centripetal force to hold the system together.

Rough Riders on San Juan Hill.

U.S. Army (William Dinwiddie)

Last shot fired.

U.S. Army (Morris Fineburg)

One ideological element appears to have sufficient centrifugal force to bind al Qaeda: avowed hatred of apostasy. It is probably that loathing, rooted in a radical Islam, that serves as center of gravity rather than Osama bin Laden. While he admittedly laid much of the groundwork to establish al Qaeda, it does not appear that his removal will bring collapse. Most intelligence analysts claim that even if bin Laden was captured or killed, someone would replace him. He can only be more or less effective. Thus leadership really amounts to a center of critical capability; it is an element that should be neutralized, but its absence will not end the war in itself.

Instead, the hatred of apostasy draws raw power—recruits, money, and support of other states—and motivates members to wage a particular style of asymmetric warfare. Thus decisive defeat will require neutralizing that center. However, accomplishing that defeat will mean employing the diplomatic and informational elements of national power as deliberately as the military one. It will also require the support of moderate Islam.

The Armed Forces have reached a critical point. On the one hand, the concept of center of gravity could be replaced by *center of criticality* to more accurately represent its original meaning. Then center of gravity can be deleted from the military lexicon. On the other hand, if the concept is retained to focus on an element that compels an enemy to collapse, center of gravity should be redefined to mean focal point. By choosing the latter path, planners would be better positioned to incorporate ideas such as effects-based operations. But the concept must be applied judiciously. At a time when an enemy can operate in a decentralized manner globally, certain situations may arise in which the idea does not apply and pursuing it will not benefit warfighters. **JFQ**

NOTES

[1] Huba Wass de Czege, "Clausewitz: Historical Theories Remain Sound Compass References: The Catch Is Staying on Course," *Army*, vol. 38, no. 9 (September 1988), p. 42.

[2] Joe [Joseph L.] Strange, *Centers of Gravity and Critical Vulnerabilities: Building on the Clausewitzian Foundation So That We Can All Speak the Same Language*, Perspectives on Warfighting Series, no. 4, 2d ed. (Quantico, Va.: Marine Corps Association, 1996).

[3] Carl von Clausewitz, *On War*, edited and translated by Michael Howard and Peter Paret (Princeton: Princeton University Press, 1989), pp. 485–86, 595–96.

[4] Clausewitz, *On War*, p. 617. In fairness to Howard and Paret, their translation is more interpretive than literal by their own admission. They could not have foreseen the extent to which the U.S. military would take their interpretation of center of gravity literally.

[5] See Carl von Clausewitz, *Vom Kriege*, 19th ed. (Regensburg, Germany: Pustet, 1991), pp. 1009–10.

[6] Ibid., pp. 810–11.

[7] Ibid., pp. 595–96.

[8] Ibid., p. 324.