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The Principle of Mass Understood: A Qualitative Analysis for the Operational Planner

by

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A paper submitted to the Faculty of the Naval War College in partial satisfaction of the requirements of the Department of Joint Military Operations.

The contents of this paper reflect my own personal views and are not necessarily endorsed by the Naval War College or the Departments of the Navy or Air Force.

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9 February 2004

ABSTRACT

The principle of mass, more so than any other U.S. principle of war, has evolved to accommodate changes in warfare capabilities, doctrine and strategy. Despite the views of some officers, the principle of mass is not dead; in contrast, the current U.S. joint definition has actually improved on previous definitions with the change from a combat power focus to the focus on effects of combat power. The current definition conveys not only the intent of the theorists, but acknowledges the reality of the way U.S. military operations will be conducted in the 21st century. Far from being irrelevant, the principle of mass should be understood in terms of its components: 1) effects – not forces, 2) place and time, 3) joint integration, and 4) synchronization.

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> The essence of operational art lies in being able to mass effects against the enemy's sources of power in order to destroy or neutralize them.
>
> Joint Publication 3-0[1]

INTRODUCTION

Long before hoplites warred in ancient Attica and continuing today, military theorists, strategists, and soldiers have searched for the answer of what force to commit to an objective, at what time, in what place. Revered theorists such as Sun-Tzu, Carl von Clausewitz, and Antoine-Henri Jomini focused countless years and analysis on this problem. More recently, the U.S. military has recognized nine principles of war to help answer these questions: mass, objective, offensive, surprise, economy of force, maneuver, unity of command, security, and simplicity.[2]

The Joint Doctrine Encyclopedia says that the principles of war "represent the best efforts of military thinkers to identify those aspects of warfare that are universally true and relevant."[3] "The principles of war guide warfighting at the strategic, operational, and tactical levels. They are the enduring bedrock of U.S. military doctrine."[4] It is important then that every staff officer truly understand each principle in order to participate fully in the joint planning process.

Bernard Brodie offers a second value of the principles of war in his 1957 speech to the U.S. Army Command and General Staff College in Fort Leavenworth, Kansas. He points out that the principles of war, especially stated in their "brief and terse form . . . provide . . . a useful mechanism for helping one to keep some basic ideas in the forefront of [the planner's] mind."[5] Each officer, glancing at a bulletized list of the principles of war, should immediately recognize and understand the intent of those words. The problem arises when one of the principles is not understood, or is considered to be invalid.

The principle of mass, more so than any of the other principles, has evolved to accommodate changes in warfare capabilities, doctrine and strategy. But there are some officers who do not understand the principle of mass as codified by joint doctrine. These officers equate mass with forces, not effects of combat power. Still other officers believe the principle of mass is no longer relevant in the 21st century. Robert R. Leonhard exemplifies their arguments in his book The Principles of War for the Information Age. Leonhard argues that the principle of mass is dead, and should be retired in favor of Precision[1].[6] He argues that the migration of the principle of mass from concentrating forces as a means of defeating the enemy to massing effects is not logical, and indeed is too vague to be of any use to the war planner.[7] This level of ambiguity surrounding such a fundamental point as a principle of war cannot but complicate any joint planning effort, as there is no common foundation from which to construct a plan.

This paper addresses both of these erroneous positions. The principle of mass is not a matter of simple force on force equations as some presume, but must be understood in terms of its true nature, that of massing effects. Therefore, this paper argues that the principle of mass, as embodied in the U.S. principles of war, is not dead. This paper demonstrates that the current joint doctrine definition incorporates the true nature of the principle of mass as proposed by the theorists, and then proposes four components by which an operational staff planner can evaluate his compliance with the principle of mass.

[1] In summary, Leonhard says that precision warfare is the opposite of mass warfare. He argues that technology and capabilities have surpassed the need to "mass" forces, and that "massing effects" is a useless and meaningless construct. Precision should replace mass as a principle to eliminate baggage associated with the term "mass" and to fully embrace future capabilities.

THE PRINCIPLE OF MASS DEFINED

Joint Publication 1-02 offers the following definition of mass:

> Mass — The concentration of combat power.[8]

As with many definitions, the joint definition of mass does not fully explain the intent or the value of the term, nor does it intuitively convey the definition of the principle of mass. Joint Publication 3-0 offers more guidance, but only through discussion. It attempts to foster an understanding of the principle of mass by explaining its purpose and giving a rudimentary outline of how to achieve it.

> [Principle of] Mass
>
> a. The purpose of mass is to concentrate the effects of combat power at the most advantageous place and time[2] to achieve decisive results.
> b. To achieve mass is to synchronize and/or integrate appropriate joint force capabilities where they will have a decisive effect in a short period of time. Mass often must be sustained to have the desired effect. Massing effects, rather than concentrating forces, can enable even numerically inferior forces to achieve decisive results and minimize human losses and waste of resources.[9]

In essence then, and for the purposes of this paper, the principle of mass is defined as concentrating the synchronized effects of joint combat power at the most advantageous place and time to achieve decisive results.

EVOLUTION OF THE PRINCIPLE OF MASS

So how did we go from massing forces to massing effects, and is this a logical progression? The answer is that massing effects has always been at the heart of the principle

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[2] The principle of mass is still being refined in joint literature. Although the parent publication, Joint Warfare of the Armed Forces of the United States, Joint Pub 1 (14 November 2000), refers to "at the place and time to achieve decisive results," this paper uses the more current publication, Doctrine for Joint Operations, Joint Pub 3-0 (10 September 2001) as the source of the principle of mass.

of mass. We begin by looking at the early sources of the principle of mass. Sometimes referred to as the principle of concentration, it is most frequently associated with analyses of the Napoleonic wars.[10] Antoine-Henri Jomini articulated it clearly in what he called the fundamental principle of war:

> One great principle underlies all the operations of war – a principle which must be followed in all good combinations. It is embraced in the following maxims:
> 1. To throw by strategic movements the mass of an army, successively, upon the decisive points[3] of a theater of war, and also upon the communications of the enemy as much as possible without compromising one's own.
> 2. To maneuver to engage fractions of the hostile army with the bulk of one's forces.
> 3. On the battlefield, to throw the mass of the forces upon the decisive point, or upon that portion of the hostile line which it is of the first importance to overthrow.
> 4. To so arrange that these masses shall not overly be thrown upon the decisive point, but that they shall engage at the proper times and with ample energy.[11]

The essence of Jomini's analysis is that one must concentrate combined efforts successively against the enemy's decisive points at the proper time. Jomini recognized one weakness in his maxims, the definition of the decisive point.[12] Jomini felt this was simple to overcome, as there were few options: the left, middle, or the right. One would be clearly the best, one less advantageous, and the other clearly foolish.[13] Jomini's analysis was indicative of his world, where on a two-dimensional battlefield lines of forces were arrayed against similar forces. The goal was to mass forces against the decisive point along this line, that objective which when achieved, would force or aid in the capitulation of the rest of the army. Although Carl von Clausewitz emphasized that "superiority in numbers is the most common element in victory,"[14] Michael Handel points out in his book, Masters of War: Classical Strategic Thought, that Clausewitz also showed that "what matters most is not an absolute

[3] The reader is cautioned not to imbue the full meaning and intent of the current joint definition of a "decisive point" into Jomini's and Clausewitz's analyses. For the purposes of this paper, consider their use of the term to mean the part of the enemy's forces, the defeat of which will lead to the capitulation of the rest of the force.

numerical advantage but rather superiority at the decisive point, the point of engagement."[15] Clausewitz said, "Relative superiority, [is] the skillful concentration of superior strength at the decisive point."[16] In these discussions one can see both the core of today's definition of the principle of mass, and the root of much of the confusion surrounding the principle. While both theorists acknowledged the fundamental purpose – to focus combat power at a decisive point, both were trapped by their place in history: they understood numerical superiority as the logical extension of their reasoning, the best way to gain relative superiority in a world where force capabilities were essentially equal. Neither was able to comprehend the capabilities that today's technological advances bring to the fight.

The principle of mass endured though many variations into the 20th century when it was first seen in the United States in a 1921 Army training regulation.[17] By 1923 the principle of mass had been codified in Field Service Regulations:

> 379. Concentration of superior forces, both on the ground and in the air, at the decisive place and time, creates the conditions most essential to decisive victory and constitutes the best evidence of superior leadership.[18]

Of note is the emphasis on forces, although it is clear the author intends that those forces create conditions for victory, presumably through the effects of their combat power. During this period, though, the U.S. military was conducting research, following in the example of the Lancaster[19] equations, to scientifically quantify force requirements. Using the square law as a basis (which stated that "one side's weapons had to be four times as numerous or four times as good to prevail"[20]), the U.S. government created a series of rules and tables for planners to follow when determining force requirements. This line of thinking led to equivalency tables, scientifically derived analyses that allot a numerical value to the effective combat power of a given unit.

In 1949 the principle of mass was described in FM 100-5 as follows:

> Mass or the concentration of superior forces, on the ground, at sea, and in the air, at the decisive place and time, and their employment in a decisive direction, creates the conditions essential to victory. Such concentration requires strict economy in the strength of forces assigned to secondary missions. Detachments during combat are justifiable only when the execution of tasks assigned them contributes directly to success in the main battle.[21]

The explanation here is still very concerned with numbers (concentration of forces, strict economy in the strength of forces), yet implies massing power or effects (forces, employed in a decisive direction, creating the conditions essential to victory). However, the 1978 U.S. Army version makes a further concession to the sources of combat effectiveness:

> Superior combat power must be concentrated at the critical time and place for decisive results. Superiority results from the proper combination of the elements of combat power. Proper application of this principle, in conjunction with other principles of war, may permit numerically inferior forces to achieve decisive combat superiority at the point of decision.[22]

Here the definition references combat power, as opposed to forces.

So how did we arrive at today's U.S. joint definition of the principle of mass? It is a product of the evolution of the way we understand that forces interact in the battlespace. Modern technology gives the combatant commander a hitherto unmatched capability to affect the battlespace through lethal and non-lethal fires, and the construct of parallel warfare.

The first element that redefined understanding of effects on the battlefield is recognition that fires come in two types, lethal and non-lethal. Lethal fires employ potentially deadly force to achieve the objective. Non-lethal fires do not, in and of themselves, project deadly force (although the results of their application may be just as deadly). As an example, consider a hypothetical enemy armored division that has recently

crossed a friendly border. Lethal fires are those applications of combat power that destroy the elements of the division or their support structure. A cell phone call convincing the enemy commander to turn around is a non-lethal fire, as would be psychological operations aimed at influencing the enemy's course of action. It is the understanding of the capabilities of lethal and non-lethal fires that has furthered the evolution of the principle of mass.

The second element that drives our understanding of the principle of mass is the construct of parallel warfare. Parallel warfare allows forces to attack an enemy across the levels of war. It allows our forces to attack the enemy based upon achieving specific effects as opposed to destroying specific targets.[23] Forces can conduct simultaneous attacks across the levels of war, exploiting the factors of time and space.[24] A modern example is the air campaign in Operation DESERT STORM. In the first twenty-four hours, U.S forces attacked over 150 targets, across the entire space of Iraq, including leadership facilities (strategic level), Integrated Air Defenses and Army operations centers (operational), and dispersed fighting units (tactical level).[25] These attacks were synchronized with specific effects in mind, or if you will, U.S. forces massed the effects of combat power to achieve objectives simultaneously across the strategic, operational, and tactical levels of war.

As discussed before, we are now aware of the myriad complex relationships that comprise an enemy's center of gravity. By massing our effects on the decisive points that we can now reach with all elements of combat power, we can strike directly at the enemy's centers of gravity.

PRECISION

What then of "precision," as advocated by Leonhard and so many others? Precision is a method, a means of conveying mass. Precision is affecting the decisive point, targeting it exclusively. Whether this means the ability to isolate a single person, to target a specific force or point of infrastructure, or to minimize collateral damage at the point of operations, precision should not be a principle of war, but a necessary attribute to the conduct of operations in the 21st century. As Russell Glenn states in his article, No More Principles of War?, "If one missile, bomb, or artillery projectile can achieve a desired outcome, it is a supremely effective and efficient application of the principle of mass."[26]

COUNTERARGUMENT

One could argue that this whole line of analysis is wrong, and that it is impossible, if not improper, to attempt to extract the intent of theorists on such a narrow issue. That Clausewitz and Jomini meant numerical superiority, nothing further, in their analyses. There are two counter-points to this argument, the "why stop now" argument and an empirical argument.

"Why stop now" refers directly to the fact that militaries around the world have been applying the principle of mass, or concentration, for over one hundred fifty years. In that time, war departments have made allowance for technology, for the fact that one cannot "disregard the fighting value of the troops involved [which is a given quantity]"[27] as Clausewitz did when he conducted his original analysis. They understand that there are differences in training and morale as well as capabilities, and have honored such technological advancements as the tank, or the fighter aircraft. They have invested

extraordinary time and effort in developing heavily researched tables of force-equivalents to ensure they are meeting the principle of mass, and that they are bringing the appropriate level of force to bear. Why then stop there? The argument that it is not logical to step from number of troops to massing effects means that it is also illogical to step from number of troops to combat power. Both steps are based on improvements in technology or, more specifically, increases in capabilities.

The second argument is perhaps more persuasive. Let us assume that the current joint definition of mass is a valid expression of Clausewitz's and Jomini's intent. Then, the substitution of our current understanding into their writing should have no effect on their conclusions – it should mean the same thing. Let us use Jomini's fundamental principle of war as an example, substituting "concentration of the effects of joint combat power" for "mass" (or "bulk" in the second maxim):

> One great principle underlies all the operations of war – a principle which must be followed in all good combinations. It is embraced in the following maxims:
> 1. To throw by strategic movements the [concentration of the effects of joint combat power] of an army, successively, upon the decisive points of a theater of war, and also upon the communications of the enemy as much as possible without compromising one's own.
> 2. To maneuver to engage fractions of the hostile army with the [concentration of the effects of joint combat power] of one's forces.
> 3. On the battlefield, to throw the [concentration of the effects of joint combat power] of the forces upon the decisive point, or upon that portion of the hostile line which it is of the first importance to overthrow.
> 4. To so arrange that these [concentrations of the effects of joint combat power] shall not overly be thrown upon the decisive point, but that they shall engage at the proper times and with ample energy.[28]

While it presents a difficult read, the end result is still the same. The difference between the original verbiage and this version is the allowance for capability. A similar application against Clausewitz's writing produces the same results. Mass is alive and well,

and better defined. So how then can the operational planner better understand the intent in the principle of mass?

COMPONENTS OF MASS

Leonhard argues that the current joint definition of the principle of mass is too vague to be of any use to the war planner.[29] In some respects, his point is valid. When asked if a plan encompasses the principle of surprise, one can ask, "Was the operation conducted in such a manner that the enemy was unaware of our objectives and/or operations for as long as we desired?" For the principle of economy of force, one can ask, "Have we diverted essential forces (or effects) away from the main focus of our efforts?" What then do we ask about the principle of mass?

We have determined that the principle of mass is "concentrating the synchronized effects of joint combat power at the most advantageous place and time to achieve decisive results." One could then ask, "Have we concentrated the synchronized effects of joint combat power at the most advantageous place and time?" This question is as unwieldy as the original statement, and is too complicated to lend itself to quick analysis. It is better then to organize the principle of mass into components for easier evaluation. If we understand that concentrating these effects to achieve an objective is not a variable, but is the overall goal of the discussion, and that clearly the goal is to achieve decisive results, then the principle of mass can then be broken into its four critical components: 1) effects – not forces, 2) place and time, 3) joint integration, and 4) synchronization. It is perhaps more illustrative to the planner to ask four questions in lieu of these shortened versions: 1) Have we massed effects or forces? 2) Have we massed our effects at the most advantageous place and time? 3) Have

we integrated all the elements of combat power? 4) Have we synchronized these effects? We will address each in turn.

EFFECTS – NOT FORCES

Our understanding of today's principle of mass hinges upon the planner's understanding of effects of forces, as opposed to forces themselves. Though Joint Pub 1-02 does not offer a definition of "effects," according to Edward A. Smith, author of Effects Based Operations: Applying Network Centric Warfare in Peace, Crisis, and War, "an effect is a result or impact created by the application of military or other power."[30] He further states, "effects may be kinetic or non-kinetic, and may equally be either physical or psychological/cognitive in nature."[31]

As our ability to collect information about and to analyze our enemies has increased, so then has our understanding that warfare no longer must be based purely on attrition.[32] Any enemy can be thought of as a system of systems.[33] If we concede that the opposing forces are acting to compel a political outcome, then the combatant commander can use the effects of his forces to exert control or influence over the enemy's systems to achieve his objective.[34] In other words, combatant commanders can achieve decisive results specifically by focusing his combat resources on the enemy's decisive points or centers of gravity to generate the desired tactical, operational, or strategic results.

For illustrative purposes, let us return to the earlier, simplified example where an enemy armored division had crossed a friendly border, and make the assumption that this division was the enemy's center of gravity for the operation. In the attrition warfare model, friendly forces would be dispatched to attrite or force the withdrawal of the armored division,

most probably engaging in combat. A problem might arise if at the strategic level it is desirable that the enemy's division remains somewhat intact to offset a neighbor's capabilities. By massing the effects of available resources, the enemy division might then be halted or forced to retreat without ever firing a round. Possible effects employed could be an overwhelming display of ground and airpower, or a bribe to the divisional commander. Psychological operations might convince the enemy that it would be wise to retreat, or deception tactics could convince the enemy he had been ordered to retreat. Forces could be used to isolate the division by cutting lines of movement by blocking a pass, or destroying a bridge. Understanding the role of effects in the principle of mass opens up the planner's mind to available capabilities, which brings us to the next factor, the most advantageous place and time.

PLACE AND TIME

The phrase "at the most advantageous place and time" has important implications to the operational planner. Note the definition does not say at the decisive point, nor does it refer to centers of gravity. Every operational planner already understands that fires should be focused towards defeating the enemy, whether directly or indirectly, at the enemy's centers of gravity or decisive points. So the phrase must have a deeper meaning.

"At the most advantageous place and time" directly relates to the previous component, effects – not forces. It is an acknowledgment of the fact that time and place are as important to the decisive nature of the effects as the effects themselves. As an example, an enemy communications center is determined to be a critical target that must be neutralized prior to an attack on an enemy position. While destroying or neutralizing this center well in

advance of the attack would achieve the goal of limiting command and control input to the fielded forces, destroying the communications center just prior to attacking the enemy position could add to the confusion of the enemy forces by limiting reaction time and compounding the impacts of the attacks. With respect to place, destroying enemy forces where they might inhibit other enemy forces, i.e. in the mouth of a pass, is more advantageous than targeting them in the open, in terms of stopping or delaying the enemy. These simple illustrations begin to provide the operational planner some understanding of the impacts of the phrase "at the most advantageous place and time." Beyond just conducting operations when it is most advantageous for our capabilities, operations should be conducted at the time and place which maximizes the effects of our fires. Where then do we get these diverse fires?

JOINT INTEGRATION

> Russell Glenn, writing at the School of Advanced Military Studies, notes:
>
> > The concept [of the principle of mass] implies the massing of the effects of all pertinent capabilities, military and other: Army assets (armor, artillery, and aviation); joint support (intelligence means, aviation, naval gunfire, and missiles); special forces; psychological operations; electronic warfare, and other means that could contribute to mission success. Whether it is steel, electrons, and convincing words applied to defeat an enemy, or the use of food and water, medical care, and engineering capabilities to aid refugees, the intent is to create and maintain success through the massing of the effects inherent in these capabilities.[35]

Though he is writing specifically for Army operations, Glenn's analysis is applicable to joint operations as a whole. USAF Brigadier General David Deptula paraphrases President George W. Bush in his paper Effects Based Operations: Change in the Nature of Warfare, saying, "Jointness is the use of the right force, at the right place, at the right time."[36] Too often operations are "stove-piped," with Service and capability integration occurring only at

the seams where lanes meet or where areas of responsibility overlap. Joint Vision 2020 identifies the pivotal characteristic of effects-based engagement as "the linking of sensors, delivery systems, and effects … across Services, and [incorporating] the applicable capabilities of multinational and interagency partners when appropriate.[37] To fully adhere to the intent of the principle of mass, the planner must work to make that joint force integration happen today. To illustrate the point, one need only refer to the previous examples and speculate from where those varied lethal and non-lethal fires might come, and the integration required to mesh those fires. Which brings us to the fourth critical component of the principle of mass, synchronization.

SYNCHRONIZATION

Synchronization is the ability to cause actions to occur in the right time or the right sequence to achieve a disproportionate impact.[38] When the Joint Force Commander synchronizes the effects of his forces, he creates effects that exceed the sum of the separate effects. Let us consider a new example. A SOF team is inserted into an enemy country to disable an early radar warning site. Air assets flow in under cover of the resulting sector blackout, and destroy a power-substation and fiber optics node serving a key enemy Army reporting post, while jamming essential radio frequencies. Ground forces then swarm into the country and fall upon an unaware opponent, causing the surrender of a heavy force of enemy soldiers. This is synchronizing the effects of joint combat power, at the right times, at decisive points, to accomplish the objective.

SUMMARY

Bringing these four elements together again, the phrase "concentrating the synchronized effects of joint combat power at the most advantageous place and time to achieve decisive results" carries a whole new meaning to the operational planner. When he looks at the bulletin board and sees "Mass" listed under the principles of war, his mind should no longer flash to images of large armies massing in the battlespace. No longer should he be thinking about a GPS-guided bomb. The four things that should flash into his mind are "effects – not forces," "place and time," "joint integration," and "synchronized fires," with the full range of options and possibilities these phrases imply. Only then will he be capable of committing the full power of the nation's resources to the development of an operational plan.

CONCLUSION

Today there are officers who either do not understand the principle of mass, or feel that it is an outdated construct without current relevance. Their views would be inconsequential, if not for the guiding role the principles of war play in our operational planning process.

This paper contends that the current U.S. joint definition of the principle of mass is not an arbitrary construct, but is the logical successor to previous definitions of the principle of war based on advances in technology and capabilities. The principle of mass is not dead; in contrast, the current U.S. joint definition has actually improved on previous definitions with the change from a combat power focus to the focus on effects of combat power. The current definition conveys not only the intent of the theorists, but acknowledges the reality of

the way U.S. military operations will be conducted in the 21st century. Today's definition recognizes the contributions of lethal and non-lethal fires, as well as the construct of parallel warfare.

The principle of mass, far from being irrelevant, should be understood in terms of its components: 1) effects – not forces, 2) place and time, 3) joint integration, and 4) synchronization. These four components drive the operational planner's understanding of the intent of the principle of mass, that U.S. forces should concentrate the synchronized effects of joint combat power at the most advantageous place and time to achieve decisive results.

ENDNOTES

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[17] Alger, 138.

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[23] David A. Deptula, Effects Based Operations: Change in the Nature of Warfare, (Arlington, VA: Aerospace Education Foundation, 2001), 3.

[24] Ibid., 5.

[25] Ibid.

[26] Russell W. Glenn, "No More Principles of War?" Parameters 28, no. 1, (Spring 1998): 57-58.

[27] von Clausewitz,194.

[28] Hittle, 67.

[29] Leonhard, 118.

[30] Edward A, Smith, Effects Based Operations: Applying Network Centric Warfare in Peace, Crisis, and War, (Washington, D.C.: CCRP, November 2002), 111.

[31] Ibid.

[32] Ibid., pg 42.

[33] Deptula, 5.

[34] Ibid., 5-6.

[35] Glenn, 58.

[36] President George W. Bush, "Address to the Air University," Maxwell AFB, Alabama, 13 April, 1991, paraphrased in Deptula, 23.

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[38] Smith, 247.

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