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A tentative model on effective army combat tactics

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ABSTRACT

The purpose of this study is to form a model on effective tactics. We selected five theorists, three of which also provided support from quantitative analysis on winning battles. The theorists all advocate the use of maneuver warfare, developed from the German WWII-approach. The analysis indicates the importance of accomplishing a sequence in battle of *surprise attacks*, followed by *shock action*, and prompt *exploitation* in order to accomplish an *organizational breakdown* of enemy force. Tactical defeat is foremost a result of *psychological* reactions by the enemy rather than from *physical* destruction by superior material resources at the point of assault.

Introduction

Training commanders and staff officers at brigade and battalion levels in applied combat tactics requires a good understanding of what could be acknowledged as effective tactics, if such a thing exists. In this article, our interest is on prescriptive theories of effective land combat *tactics*.[1] More to the point, what are the more specific theories of *effective army combat tactics*, for a mechanized army, consisting of brigades and smaller units that cannot rely on superior material resources?

In war, tactics is not conducted autonomous but as part of a strategy aiming to reach military and political intents.[2] To operationalize those intents, often in one direction or area, an operative level commanding and coordination the use of assets, resources, and branches to optimize desired effects.[3] Military effects are materialized on the tactical level, often as engagements, skirmishes, maneuvers, and battles. Battles are fought to win or in order to avoid defeat. Although, it is not always obvious identifying the boundaries between strategic, operational, and tactical levels though they are not only associated by command but also to a rising scale in volume of the action and employment of unique assets.[4] Our focus in this article is on the execution on tactical level, the battle, and theories on combat success.

The classic definition of tactics proposed by Clausewitz[5] was that "tactics teaches the use of armed forces in the engagement."[6] Clausewitz's definition of tactics is still in use in several doctrines around the world although often slightly more developed. For example, in the Swedish Army tactical regulations[7] tactics is defined as "[…] the over time varying means and methods that are being used in every situation in order to reach a specific purpose with the battle and other activities." Another definition used by U.S. Marine Corps (USMC) is that tactics is the " … the art and science of winning engagements and battles."[8] We focus this article on execution because that is when tactics is applied, but also because in our assertion execution is the more under-studied area in tactical training. Planning is of course closely connected to, and a preparation for, execution of an operation but our purpose is not to focus on planning activities per se.

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Given the idiosyncratic character of combat, there are too many influencing variables, making it impossible to isolate the influence of just a few (e.g., the influence of *tactics*). However, according to Höiback,[9] this is not different from most other social sciences, dealing with human beings as agents, acting in a complex environment. Even though military theorists cannot produce strict laws about causal relationships as in the natural sciences (i.e., if A occurs then B will *always* follow), they can still find probabilistic relations between variables that can be used to partially explain a situation rather than only describe it. Such probabilistic relations have the character of: If A then *sometimes* B will follow. One such example of a probabilistic relationship could be: *If* a force manages to execute *a surprise attack* (A) *then* it is highly probable that it will be able to *defeat enemy force* (B).

The purpose of this study is to form a model on what tactics army units and formations should use in battle in order to gain tactical success. We will restrict our model to conditions similar to the current national territorial defense[10] with a smaller but modern mechanized force, having to fight against an enemy force with superior resources. We are thus looking for empirically based principles and practices on how a smaller force can repel and defeat a larger force in conventional/regular land battles. Another restriction is that we will limit the formation of a model to the area of tactics. Several countries tend to describe their military warfighting capability as consisting of three components: the *conceptual*, the *moral*, and the *physical*.[11] Tactics is based on doctrine, which (together with principles of war and other policy) belongs to the conceptual component. Other important factors such as leadership, motivation, equipment, and manpower of a force will thus not be included in this article. In the next part, we address our main findings based on theorists and their research.

In this section, we argue that hypothetically, if all the steps are followed in given order, the likelihood of winning the battle increases, and if the opponent does not follow the steps, the chances of winning increase even more.

The major elements or steps in this *ideal model* is deployment to conduct deep maneuver and surprise attacks, and to prevent enemy breakthrough of own defensive lines. Next step is aggressive ground reconnaissance to find gaps for own maneuver, and to avoid surprising enemy breakthrough, and to blind the enemy. Third step is maneuver and the understanding of own and enemy systems capabilities, strengths, and weaknesses in interaction. Out-pacing is the ability to implement action faster than the enemy. Fourth step is the breakthrough to find gaps and use opportunity to deep maneuver and also adjust the plan flexibly to maximize the use of opportunity. Fifth step is high tempo and surprise through deep attacks on enemy units not prepared to fight, preferably from unexpected directions, low alert units, and key units (C2, logistics, etc.). Sixth step is the creation of shock but also to avoid own premature culmination and continue fighting escaping enemy units. Finally, the surprise and the shock scatter, divide, suppress, and paralyze all resistance in an enemy organizational breakdown. Those steps will be discussed in detail and examine through the theories when we building a sequenced model on how to execute maneuver warfare and tactics. But before that, we present chosen theorists and argue why they are representative to maneuver warfare. In the next part, we discuss the empirically based theories on how to win battles followed by how we analyze and build the sequenced model on how to execute tactics and maneuver warfare. Finally, we have a discussion on our findings.

Initially, we will discuss criteria on how to determine the relevance of research, given our purpose to develop a model on effective army tactics. We will examine theories and theorists with insight into the military practice, with the ambition to providing quite detailed knowledge on tactics, including experience from recent conflicts involving regular army forces. We should also be especially interested in tactical concepts supported by quantitative analysis and not only by reasoning. It was decided not to include military doctrines in the search because these documents are authoritative, and seldom provide logic or explanation in a way that scientific texts do.

One suitable classification of military theorists (and theories) is provided by Höiback, he himself being both a military practitioner and theorist.[12] According to Höiback, there are two

Ideal Model sequence
Modern System deployment of the force and use of maneuver warfare.
Aggressive ground reconnaissance and counter-reconnaissance.
Maneuver and out-pacing the opponent by focus on timing and by a short decision-action loop.
Breakthrough by deep and fast maneuver in enemy gaps.
High tempo and surprise attacks on enemy rear/ unprepared units.
Exploit successful surprise attacks to create shock.
Enemy organizational breakdown

Figure 1. An ideal sequence to accomplish enemy organizational breakdown and victory.

traditions in military theory, dating back to Jomini and Clausewitz. Jomini limited his interest to the military realm, and prescribed how to use military forces in the war. Clausewitz focused more on providing a holistic understanding of war as part of politics and society. He was explicitly against prescriptive rules on military tactics. According to Höiback, there is a need for theorists of both ambitions, and Clausewitz and Jomini both have followers. We need to primarily look for followers of the Jominian tradition, and regarding regular army tactics Höiback[13] especially points to Stephen Biddle and his work: *Military Power – Explaining Victory and Defeat in Modern Battle*.[14] Here Biddle provides rather detailed advice on effective army tactics and his conclusions are based on extensive quantitative analysis of recent conflicts, including Kuwait 1991.

Another theorist is B. A. Friedman. Theoretically, Friedman is influenced by the work of J. F. C. Fuller and B. H. Liddel Hart.[15] Friedman is a proponent of the *indirect approach* and the German WWII way of conducting *maneuver warfare*. His book, *On Tactics*, provides advice on effective ground force tactics in combat.[16] Friedman's book is however not based on extensive historical primary sources. The value is more as an interpretation in terms of practical advice on how to conduct effective maneuver warfare. Friedman, as an officer in the USMC, was influenced by the principles of maneuver and prioritization maneuver over mass and firepower as one of the keys to tactical success. Maneuver warfare and the indirect approach are dominating concepts in several western armies today, including the Swedish Armed Force.[17]

Another proponent of land maneuver warfare is Robert R. Leonhard, a former lieutenant colonel in the U.S. Army. In 1991, Leonhard described both the German and the former Soviet-union ways of maneuver warfare, and in this book *Fighting by Minutes: Time and the Art of War* Leonhard develops a comprehensive theory on how to understand and use the time dimension in land warfare and tactics. Like Friedman, the primary value of Leonhard's work is that he translates "theory" or military thought into more practical advice on maneuver warfare.[18]

Work supporting the effectiveness of different combat tactics with quantitative analysis is also of interest. Except Biddle, we found work of the American sociologist Randall Collins: *A Dynamic Theory of Battle Victory and Defeat*. In the article published in *Cliodynamics: The Journal of Quantitative History and Cultural Evolution*, Collins offers a model of battle victory and defeat based also on quantitative analysis. Collins' work is based on historical literature (especially from the U.S. Civil War) however, given the relative stability over time of the human psyche, we think that Collins' model offers valuable insight into the human aspects of battle victory and defeat.[19]

Another theorist and practitioner relevant for this article is Jim Storr, a former British army officer, with experience both from field service and from writing doctrine. His book, *The Human Face of War* (Storr, 2009), covers many aspects of combat and army tactics, also at the brigade and battalion levels. It has received positive attention for being insightful. Storr provides both theoretically and empirically based advice on how to gain tactical success. He references not only theoretical work but also quantitative Operational Analysis and Historical Analysis.[20]

In total, these five theorists offer the main sources for model development. They are all proponents of developed versions of maneuver warfare in the German WWII style. Among military theorists and doctrine writers in the western world, there seems to be a high level of consensus that maneuver warfare as an ideal type is preferred over attrition warfare. However, as noted by Edward Luttwak there is a reasoning about how to conduct maneuver warfare in detail, using the spectrum between physical destruction and disrupting enemy's system such as command structure.[21] Our purpose is to contribute to this reasoning by analyzing and comparing the different theorists' views and make conclusions on how to execute tactics in an effective way.

Empirically based theories on how to win battles

What are the different ways or general tactical approaches to defeating an opposing force in battle? Collins surveyed (some of) the historical literature on battles and works of military doctrine and found three different main theories of winning battles.[22] The first of these places an emphasis on *material resources*, sometimes referred to as force ratios. In short, victory tends to go to the side with more troops and more resources, through attrition of the side with less material resources. The second element emphasis *maneuver*. Victory comes through fast and unexpected movement of own forces that result in surprise and sometimes shock and disorganized resistance from the opposing force. The third main element puts an emphasis on *superior elán* (sometimes referred to as better quality of troops in terms of morale, cohesion, fighting spirit, etc.). Victory then comes to the side that has higher quality troops, including quality of generals, officers, and noncommissioned officers. Based on his analysis, Collins presented a comprehensive dynamic model of battle victory and defeat. Collins concluded that in order to win it is important to accomplish an *organizational breakdown* of the opposing force.[23] Collins argued that there are two main causal pathways to accomplish that. One is from superior *material resources* via logistics and *superior firepower at point of assault* and the other is from *morale* (composed by factors such as *emotional energy*, *discipline*, and *coordination*) via *maneuver*. According to Collins,[24] there is a stronger causal link from maneuver to organizational breakdown than from superior firepower. This is mainly because maneuver, if it is fast and/or concealed and based on accurate intelligence, can result in surprise attacks from directions and at moments unexpected by the opponent and against rear areas with troops not intended for direct battle (e.g., logistic and command and control units). Surprise attacks can result in shock and disintegration and Collins concludes that it is often after a force disintegrated that it suffers the greatest losses of materials and soldiers.

Collins' model[25] highlights that battle defeat is most of all a *psychological* condition. Triggered by surprise and shock from an unexpected attack, the enemy units start to disintegrate to a degree where organized opposition gets increasingly difficult, and the enemy soldiers lose the *will* to continue to fight rather than that of their *physical ability*. The local organization can no longer perform effectively and the attacker can inflict great losses by continuing to attack disorganized units. Thus, through *maneuver*, a smaller force can win against a considerably larger force, and victories can be won with relatively small losses. Collins is thus providing statistical support for maneuver warfare for a materially and numerically smaller force. Collins' model is complex and it provides a comprehensive framework for how to understand victory and defeat in battle.

Biddle also studied factors related to victory and defeat and presented a comprehensive theory on how material and non-material factors interact to produce real combat outcomes.[26] Based on studies including quantitative analysis of actual battles, Biddle concluded that a particular non-material factor, labeled *force employment* played a crucial role, more important than material factors. Force employment is the "… doctrine and tactics by which forces are actually used in

combat ….”[27] Biddle argued that in the end of World War I (1917–1918), a highly complex and sophisticated system of both defense and offense was developed and implemented by both sides on the western front. This system is called “The Modern System” and the ability to master it is a crucial factor for accomplishing tactical victory on the battlefield. Although a lot of technical development has taken place since 1918, Biddle argued that the basic principles e.g., cover, dispersion, and concealment for effective offense and defense are still the same today.[28] Biddle’s term “Modern System” is effectively the same as the term “maneuver warfare.” According to Biddle, to apply modern-system tactics, it takes a well-trained force, supported by a relevant doctrine, and a high spirit or elán in the force.[29]

Jim Storr presents comprehensive research on effective army tactics. It includes work on tactical success, and Storr[30] refers to the analysis of 158 land campaigns from 1914 and onwards, made by David Rowland and his colleagues at the British Defence Operational Analysis Centre.[31] In these studies of factors related to victory and defeat in land campaigns, Rowland et al., according to Storr, found that just a few factors dominated the probability of success at campaign level. The first was surprise, the second possession of air superiority, the third aggressive ground reconnaissance (i.e., to aggressively explore the battlefield and exploit weak spots and opportunities as they were discovered), and the fourth was shock. Storr continues: “All four factors were individually equivalent to large multipliers in force ratio, in terms of impact on campaign outcome.[32] They were far more important than factors such as force density and achieved force ratio.” Storr further concludes that “… the impact of shock and surprise can be seen to be a consequence of rapid, almost chaotic changes of the situation ….”[33]

Storr[34] points to the importance of attacking the enemy’s *will* to fight, and the unit or organizational *cohesion* rather than the *physical ability* to fight, as this is the most effective way to win battles. According to Storr, successful maneuver, resulting in surprise attacks, followed by heavy firing, results in individual enemy soldiers becoming stunned and demoralized which in turn can result in *reduced participation* in the fight, panic, and flight, which in turn results in tactical success.[35] This is, to our understanding, the same phenomenon that Collins labeled *disintegration*, resulting in organizational breakdown.

Both Storr and Collins highlight the potential effectiveness of maneuver warfare based on fast movements and unexpected sudden attacks that strive to accomplish surprise and shock. Enemy strengths should be avoided, such as frontal attacks on combat units. Enemy weaknesses should be attacked, such as flanks/rear or key units not intended for fighting (e.g., logistics). Storr’s conclusions seem to be well in line with Collins’ and Biddle’s results.

After presenting empirically supported theories on what factors contribute to winning battles, and also discussing what “winning” or tactical success is, we will now start to develop our model on effective tactics for a land force, based on the theories on winning. We will do this by answering a sequence of questions presented logically from an execution perspective, and from the theories on winning battles: (1) How to initially deploy a force? (2) How to maneuver? (3) How to accomplish a high tempo? (4) How to create/accomplish surprise? (5) How to create shock? (6) How to accomplish enemy organizational breakdown? In other words, we are constructing a sequenced model of maneuver warfare, in order to win land battles. The model will be detailed to the degree that the surveyed literature is detailed in its recommendations. The method we use is qualitative text analysis. We analyze the five (previously introduced) texts based on the six steps in our execution-based model of maneuver warfare and we look for statements (meaning) that can be sorted into the different steps. As with all subjective analysis, there is a risk of distortion or misunderstanding of the source material, partly based on our own pre-understanding of tactics and partly based on the vagueness and ambiguity of language itself. In order to reduce the risk of misinterpreting the material, we did the initial analysis separately between the two researchers and then agreed on a common interpretation. In the next part, we put forward our common interpretation as an ideal sequence model.

Building a sequenced model on how to execute maneuver warfare and tactics

How to initially deploy a force?

Initial force deployment should in the best way prepare for the subsequent battle activities. Initial force deployment can also be seen as the result of planning before battle and by that becomes the starting point of force employment. How to deploy in a specific case is dependent on the ordered task and details of the specific situation, e.g., force capabilities, relative force ratios on both sides, and terrain, etc. A brigade-sized force can have several different tasks however; all of them are to some degree a combination of offensive and defensive operations. However, and as stated in many doctrines[36] defeat of an enemy can only be accomplished through the offense. We can foresee two basic scenarios such as an attack against an attacking enemy and attack against a defending enemy.

In order to deploy the force, initially, the expected and imminent contact with the opponent on the battlefield, it is important to understand the underlying principle of maneuver warfare. In order to explain this principle, Leonhard makes use of the basic elements of combat, *Move*, *Strike*, and *Protect*.[37] Maneuver warfare is principally based on *moving* and *striking*, and *protection* comes implicitly either through concealed movement or through high velocity.[38] This principle is true for both defensive and offensive operations. The idea being to reduce the need for protection from enemy strengths by avoiding them in time or in space. Theoretically, a force using maneuver warfare should not need to devote forces for protection when avoiding enemy strengths, but in practice, this is seldom viable. According to Leonhard,[39] there is always a need for balanced measures of force protection. However, force protection, especially if it involves measures such as field fortifications, takes time, and effort and will reduce the overall velocity of the attacking force. Thus, there is a need for risk-taking. The implication of this reasoning, according to Leonhard, is that there is a need both for a *holding* force-element that will protect against that part of the enemy strength that cannot be dislocated and for a *mobile* force-element whose purpose is to attack the flank or the rear of the enemy.[40] For a brigade operating without support of other units (e.g., the spearheading brigade in theater), the implication could be that it must deploy both a holding element and a maneuver element.

Biddle emphasis the importance of how a force is employed on the battlefield in order to both preserve its strength against attrition and to concentrate force to accomplish (or block) a breakthrough.[41] This way of employing the force is defined as "The modern system." According to Biddle: "The key elements of a modern-system offensive tactics are cover, concealment, dispersion, small-unit independent maneuver, suppression, and combined arms integration."[42] For defense, the elements are the same but differently applied.[43] A force-element in defensive positions should strive to use the terrain for concealment and to dig in and prepare for counterattacks as much as time permits. An offensive force-element should also use the terrain for concealed movement, cover, and dispersion in order to preserve its strength.

Regarding initial deployment for offensive operations Storr[44] is in line with Biddle's general principles. The initial deployment of an offensive force should be balanced in a way that makes it possible both to find and delay, or dislocate, possible enemy attack formations (to avoid the element of surprise), and at the same time finding the weak points in the enemy lines and deployment. Normally there are gaps or demarcation lines between attacking enemy units. According to Storr,[45] the attacking force should also be organized to advance or infiltrate along multiple axes. An attacking force should be organized in combined arms including logistics, heavy mechanized infantry and tanks, and should have access to fire support.

According to Leonhard,[46] a defending force-element should use as much tactical depth as possible to disrupt and delay. This forces the enemy to change from movement formation to combat formation in order to advance. This slows the enemy down, results in more losses from friction and is likely to bring the enemy attack to culmination earlier. Storr stresses the importance of

counter-attacks rather than positional defense, and advocates a balance where typically 2/3 of the defensive force-element is used for counter-attacks at all levels, and only 1/3 is used for positional defense.[47] The reason provided by Storr is that immediate counter-attacks are a way to break the attacker's momentum and to disrupt his understanding of the situation.

All theorists stress the use of combined arms. The basic principle, according to Leonhard, is to attack the enemy with asymmetric systems.[48] This means that ideally although is not always possible our tanks should not attack enemy tanks but other weaker systems. And vice versa enemy tanks should be met by anti-tank units in favorable terrain and not by our own tanks, and one way to enable this is to organize units in combined arms. Storr states that combined arms also make it possible to compensate a weakness of one weapon by the use of another (e.g., the mutual support between armor and infantry in close country).[49]

A question arises regarding how many subordinate maneuver combat units should initially be committed to fight and how many should be held as reserves. It depends on the specific circumstances, but Storr[50] referencing Trevor Dupuy who analyzed over 200 battles, states that the average number of subordinates at any level, from platoon and up, actually committed to combat at the same time was normally 1.7. If we follow Storr, a brigade should not effectively be able to commit more than two maneuver units in battle simultaneously. This is a matter of limited control span. Storr also refers to the need for reserves in order to have the freedom of action to deal with inevitable situations; where the outcome of an ongoing battle is either considerably worse or considerably better than was planned for.[51]

To conclude, there are no real inconsistencies between the different theorists regarding force deployment for maneuver warfare. In offensive operations, the focus is to deploy in order to engage the enemy on multiple axes with combined arms, and at the same time be able to detect and avoid major frontal engagements with the enemy attack units. Protection of the force is mainly dependent on concealed movements, dispersion, and cover. For defensive force-elements, the focus is more on counter-attacks than on positional defense.

How to maneuver?

Initial deployment and the subsequent execution of the battle are closely tied together and not really separate phases, especially for a force that is striving for an early battle decision. Examples of such early interactions with the enemy force are intelligence collection and reconnaissance that must be initiated as early as possible, before the battle commences, with the aim of obtaining situational awareness and taking adequate measures to seize the initiative in the coming battle.

Regarding the question, *how to maneuver*, the theorists all have the same general idea when it comes to the tactics, which is to move forces in order to launch surprise attacks while at the same time disrupting, harassing, and confusing the enemy about the situation. Leonhard defines two principal ways for an offensive tactical unit to maneuver.[52] One is *infiltration*, which means to covertly penetrate enemy lines. The other is the *indirect approach*, which means to maneuver around enemy frontal forces, preferably undetected by the enemy surveillance systems. According to Leonhard, infiltration is based on stealthy movement, masking terrain, and carefully controlled movement. It needs to be done often in column formation by maneuver units and it requires detailed intelligence to enable finding gaps in the enemy surveillance. It is generally slow and vulnerable if detected early by the enemy. According to Leonhard, a maneuver around an enemy frontal unit should either be done as covertly as possible (to delay or prevent detection) or with high speed as a means of protection.

Storr advocates infiltration tactics at the unit level in offensive operations.[53] Infiltration (mounted or dismounted) should take place on multiple axes simultaneously because this will increase the overall likelihood of accomplishing surprise somewhere. Infiltration needs to be

covert if possible, and attacking units should have immediate access to suppressive fire, to fix local enemy forces and suppress enemy reserves threatening the flanks of the attacking units. Commanders should monitor the battle and reinforce successful infiltration with fire, mainly to prevent enemy forces interfering with a successful infiltrating unit's ability to advance further. Reinforcing success also means sending additional forces (reserves) where initial success has been accomplished, even if it was not part of the original battle plan. Storr also mentions night attacks as a means to accomplishing successful infiltration. The penetration must also be supported by aggressive ground reconnaissance (including tanks) to obtain initial higher level opportunities for surprise.[54]

Storr places a special emphasis on the importance of *aggressive* ground reconnaissance (and other means of gathering intelligence) as a way to avoid being surprised and to avert enemy eyes and thus the ability to uphold a clear picture of the situation.[55] Also, Friedman underlines the concept of surface and gaps as an important idea that through own aggressive (or offensive) ground reconnaissance discover weak points, or gaps in the enemy deployment and between advancing units, and also to disrupt and harass enemy forces.[56] Thus, reconnaissance is not only about determining enemy advancements and deployed forces. Storr (ibid) sees *aggressive* ground reconnaissance as the first ingredient to find initial, higher level opportunities for surprise and preemption and thus take the initiative. Such aggressive reconnaissance in Storr's opinion requires tanks (not only reconnaissance vehicles) and can be seen also as potential spearheads in deep maneuver and surprise attacks.

Storr presents three different mechanisms to underpin his infiltration concepts. The first is a mechanism for *dynamic protection* of the attacking (infiltrating) units. Storr suggests that this should normally be done by a unit in a second echelon, preferably with armor; and needs to be flexibly prepared to protect the infiltrating units flank or rear as it moves on. The second mechanism suggested by Storr is *speed*. According to Storr, the best protection for a penetrating/infiltrating unit is to continue moving deeper with high speed, since this makes it difficult for the enemy to employ effective counter-measures. Storr's third mechanism is *bypassing* where he states that it often makes sense to drive a long way around an enemy in order to avoid a (premature) battle. This also gives the opportunity for a (later) attack on the enemy's local flank or rear. Bypassing, as opposed to passage through, own forces should also be a sensible option in many cases according to Storr.[57]

To conclude, there seems to be some difference between Storr and Leonhard on how to define infiltration. Storr uses this in a more general way of breaking through enemy lines but Leonhard uses infiltration more exclusively for a covert penetration. Moreover, there is consensus that the maneuver should aim at avoiding frontal confrontation with, and attrition from, the enemy; find gaps, flanks, and rear of enemy units, and at the same time create confusion and disruption.

How to accomplish a high tempo?

Leonhard, Friedman, and Storr all point to the importance of being able to both decide about, and implement, action (and counter-action) faster than the opponent.[58] Friedman, referring to Boyd's OODA-loop suggests that the purpose of maneuver warfare should be to out-pace the enemy by constantly being able to read the situation, make decisions (at all levels), and implement action faster than the enemy. According to Friedman, in order to accomplish a superior decision-action loop, the force should use decentralized command and mission-command type orders, with a high degree of freedom for subordinates at all levels to decide how their tasks should be solved.[59]

Leonhard uses the terms "directive control" vs. "detailed control."[60] The focus should be how to accomplish the higher commander's intent and endstate (the purpose of the battle) rather than

on fulfilling a specific task. Another important requirement in guiding the subordinates' coordinated actions is for the commander to designate a *main effort* in his plan (it can be either one of their own units, a terrain, or a specific period of time). By doing so all subordinates will understand the superior commander's main priority. Leonhard generally agrees with Friedman but also points to the importance of thorough preparations of the sequences in a battle as a means of accomplishing a high tempo. He also more clearly than Friedman advocates a need to combine directive and detailed control depending on the need for synchronization. Using directive control or mission tactics, suggests the balance of decision-making authority and intelligence flow to minimize the time delay between decision and action.[61] Military decisions are in its nature dynamic and complex. To solve a dynamic decision problem, it requires a series of decisions rendered in combat effects. Tempo is measured in decisions and actions when executed, often with the purpose keep a higher pace than the opponent.

Storr as Friedman is a proponent of high tempo and mission-command type orders. Storr discusses the value of fast decisions and shows that it is an advantage in a chain of command to make less detailed decisions (orders to subordinates) very quickly, which are "about right" so they can be implemented faster than the enemy can respond.[62] If our forces can make two "about right" decisions at the same time as the enemy can make one, then the enemy's actions will be increasingly inaccurate and irrelevant. This will eventually create a situation of desperation and reduction of will to fight. Storr references a Soviet finding[63] " … a force that can react twice as fast can defeat one five times as large."[64] Striving for quick decisions generating a *general idea should be paramount*, rather than decisions formed as detailed plans. Storr claims, those decisions should typically be taken in small command posts (CPs) because it is much faster to collaborate in small teams. Routine scheduled and comprehensive staff procedures for decision-making need to be avoided for the same reason.[65]

Leonhard point to the importance of a force being able to quickly seize initiative and take advantage of opportunities. Such opportunities are difficult or impossible to plan, so low-level commanders must be allowed and equipped with assets (ability to combine arms and have access to suppressive fire support) in order to act quickly on an opportunity. Leonhard asserts that this is hardly possible at all command levels simultaneously, so it has to be decided in advance which level should be primarily "decisive."[66]

According to Storr, the initiative in the chain of command should in a way flow upwards instead of downwards and superior commanders should organize and command the force in a way that supports the subordinates' initiative.[67] This means that commanders at all levels must retain some reserves, so they can quickly support initiatives at the lower level. Subordinates and their CPs should also be trained to interact in a chaotic and uncertain environment both in order to be reasonably predictable to each other, but also to be able to coordinate action fast.

Storr discusses the size of reserves.[68] His conclusions are that because speed and timing are more critical for success than force ratios, it would generally be better with smaller reserves that take less time and preparations to move. He advocates that reserves at brigade level should be battalion strength, and a company at battalion level, but at higher levels, the reserve should be "two down," i.e., still a battalion at the division level.

We see small inconsistencies between the theorists regarding high tempo. It regards the need for a designated main effort and a pre-planned deep operation with successive objectives. Storr seems to advocate that combat should be conducted as opportunities develop. This seems to implicate no pre-planned concentration of forces and that this should be done opportunistically. Both Friedman and Leonhard, however, advocate the need for a main effort or at least a prepared and orchestrated penetration.[69] In a situation where the enemy is deployed more statically defensively, or where the attack is directed more against a specific terrain objective, then a more orchestrated plan with a designated main effort could be more effective. This distinction is also highlighted by Biddle.[70]

How to create surprise?

A key ingredient for a smaller force to win a battle against a larger one is to achieve surprise attacks. Storr refers to the studies by Rowland et al, mentioned earlier, and stating that "… in 95% of all occasions where surprise was created, the effect was at least as great as that of a force ratio of 10:1."[71] Storr also concludes from historical analysis of a large number of infantry battles at battalion or company level that in a successful surprise attack directed against an enemy flank or rear, an attacker tends to inflict at least twice as many casualties on the enemy as he suffers himself. And, the probability of success in an attack where surprise occurs is about 75%, and is largely independent of force ratios between the attacking and attacked force.[72] So what is surprise and how should surprise be achieved?

According to Storr, surprise has both physiological and perceptual effects.[73] The physiological effects are increased negative arousal, feeling of uncertainty, attentional blinks (a temporary loss of contact with reality, resulting in memory loss for a short period in time), and the cessation of ongoing activity. It typically lasts only for a few seconds, but that can be long enough to lose a firefight. Storr claims that over a longer timeframe the perceptual effects of surprise are perceived stress, ineffective attempts to reduce uncertainty, and information overload. These effects tend to result in less rational behavior and less effective decision-making at the command levels. A commander and staff then tend to get big-picture blindness and try to micro-manage the situation in a less effective way.

Surprise can be realized in a number of ways and all three theorists mention *unexpected timing*, *direction*, *means*, and *methods* of an attack. Unexpected timing can be accomplished for example by being able to attack in a higher tempo, move faster or longer, or go from one mode to another faster than the enemy would expect from studying our own doctrine.[74] According to Storr, attacks launched earlier than an enemy unit has expected, are especially effective.[75] Surprise through unexpected direction is especially effective if the attack hits an enemy flank or rear. Storr also mentions night attacks as a means to achieve surprise. Unexpected methods of attack can be a result of applying new tactics for the attack.

Leonard points to two other ways to effectuate surprise. The first is *delaying detection* and the other is *hastening contact*.[76] Delaying detection is about shortening the time between when the enemy *detects* a threat and the time the enemy is *attacked* (e.g., by stealthy movement, masking terrain, carefully controlled movement, removing enemy reconnaissance and surveillance, or approaching the enemy from an unexpected direction).

Hastening contact is about *attacking* the enemy when he is not *prepared* (i.e., *before* he is prepared for an engagement or *after* he has culminated). Here the *speed* of the attack is of utmost importance, at the expense of the *force* of the attack and this will make it impossible to rely on combined arms. The velocity of the attack equals the speed of the fastest unit. Leonhard calls this "preemptive tactics." He contrasts "preemptive tactics" with "concentration tactics" which is also about attacking an unprepared enemy, but here the *force* or *mass* of the attack is in focus rather than the *speed*.[77] The attack is made by a synchronized combined arms force and the velocity of the attack equals the speed of the slowest unit.

According to Leonhard, there is a need to balance between preemptive and concentration tactics in order to avoid culmination.[78] Successful preemptive attacks must often be followed by concentrated forces attacks. Other examples of temporal tactical situations, according to Leonhard, are the *spoiling attacks* (i.e., a counter-attack against an enemy, himself preparing to attack; an *ambush* (i.e., an attack against a moving enemy); *exploitation* (i.e., a rapid follow-up attack after a successful engagement in order to take advantage of weakened enemy defenses), or a *counter-attack* (i.e., a rapid attack against an attacking enemy that has reached the moment of culmination).[79]

However, a defensive surprise, according to Storr, can be accomplished through methods such as "… tactical depth, the concealment and subsequent use of reserves, or by the sudden

withdrawal to defensive positions in the rear. Deception, intelligence, security, speed and originality are major factors in achieving surprise."[80]

According to Friedman, surprise in combat rises from action not to be expected in time, place, or capabilities by the opponent to which he is not mentally prepared for.[81] To conclude, there is largely consensus between the theorists regarding both the importance of and the means to achieve surprise.

How to create shock?

Shock, together with surprise, is another important ingredient in battle. Storr is the only one of our theorists who clearly separates between shock and surprise. According to Storr, shock has two main effects on the battlefield. The first is to reduce the effectiveness of a defensive force subjected to shock, as measured by the rates of casualties for the attacker. The reduction can be as much as 40% less casualties, according to Storr, refereeing to statistical analysis of historical battles. The second effect of shock, according to Storr, is that the defense gets disrupted, although this effect is both variable and unpredictable. Effectual disruption is that individuals or small groups in the defending force will give up or withdraw while others may continue to resist. Storr states that the overall effect will depend on the attacker's ability to follow up and exploit the initial success; and on the defending commander's ability to react effectively to restore force cohesion.[82]

Storr uses a medical analogy to explain shock as a phenomenon. At the individual level, shock is a state when the individual is numb, unresponsive and perhaps behaving irrationally. At a small unit level, shock can be expressed as strongly reduced effectiveness through individual soldiers in large numbers showing reduced participation (e.g. hiding in trenches instead of returning fire, panicking, and escaping the battleground). Both commanders and units have lost their will and cohesion. Commanders and staff can no longer issue relevant orders to the events.[83]

According to Storr and Friedman, shock can be a result of several factors in combination, such as "… surprise, rapid bombardment, sudden approach [from an attacker], the use of armor [in an attack] and the use of certain types of weapons." It may involve night and poor visibility. Storr calls these factors *shock actions* and concludes that shock action, especially in connection with surprise, has a significant effect in determining battle success, and shock only happens to a defending force.[84]

Storr states that "Without some mechanism of shock action, combat is rarely decisive." Storr concludes that the main role of infantry and armor in battle is to be instruments of shock actions and he calls these "shock troops." They should strive to penetrate but to avoid frontal assault of enemy units. They should then be prepared to attack rapidly with heavy direct fires as well as with fire support, in order to exploit a successful maneuver and surprise. In Storr's opinion, these units are primarily close-combat groupings and other units should be used for deep operations required at higher level.[85]

Friedman presents shock effects as a state of psychological blank inflicted by the unexpected or successive action of the opponent. Often, shock occurs from the result of a combination of deception, surprise, and confusion.[86]

How to accomplish enemy organizational breakdown?

In Collins' discussion, both sides in a combat situation suffer from organizational breakdown to a degree by frictions. According to Collins, the most important result of maneuver is to bring about organizational breakdown as the key to victory.[87] When a local enemy formation suffers from surprise and shock it will start to disintegrate through reduced participation in the fight from soldiers and whole units according to Storr.[88] Reduced participation means that organized resistance will be increasingly difficult. If the attacker at that point can both keep enemy adjacent units and

reserves from counter-attacking, for example by suppressing fires, and at the same time following up (exploiting) the initial surprise and shock with more force; there is a high likelihood that the force under attack will take heavy losses and surrender or escape, i.e., *break down*. At this point, the will to fight and the organizational cohesion of the unit under attack will be broken. This is the definition of *winning*, or in Storr's terminology, *tactical success*. This is the way a smaller force can defeat a larger one. If such local success can be accomplished concurrently by other units in the attacking force at other places, then there should be a good chance to break the will and cohesion also at higher command levels of the enemy force. In order to exploit the initial results of surprise and shock, Leonhard[89] agrees with Storr on the importance of the ability to continue in a follow-up attack and avoid premature culmination. Leonhard advocates that in battle, the value of an action that follows directly after another action increases, and the more actions that can follow directly upon previous actions, without time-consuming preparation in between, the more the commander can multiply the effects against the opposing force. Both Leonhard and Biddle highlight the need for thorough preparations and available reserve forces in order to transition as quickly as possible from one stage to another, in order to exploit a successful attack (or to avoid to be exploited after an unsuccessful engagement).[90] Storr appears more skeptical of highly synchronized plans in advance and instead advocates the ability for the force to organize more generically in order to be able to exploit success.[91]

Discussion

The purpose of this study was to form an initial model on what tactics army units and formations should use in regular or conventional battles in order to gain tactical success. We focused on tactics for a smaller but modern mechanized force, fighting against an enemy force with superior resources. We wanted to focus on execution of combat and therefore we organized the study from a sequenced execution perspective, where we tried to answer a series of questions consisting of deployment of forces, maneuver, high tempo, surprise, shock, and how to accomplish enemy organizational breakdown?

The most interesting result is perhaps the support, from previous quantitative analysis of battles, for the significance of the *surprise-shock-exploitation* sequence as a means to achieving tactical defeat (organizational breakdown) of a *numerically superior* enemy force. Strive to accomplish surprise and exploitation has been included in the concept "maneuver warfare" for a long time, but here we see how surprise-shock-exploitation can be implemented and why it works (Figure 1).[92] Based mostly on Collins' and Storr's work it seems reasonable to conclude that *surprise attacks* committed with *shock actions* directly followed by *exploitation*, tend to reduce the need for superior force ratios for an attacker. This is because surprise attacks using shock actions independently equals force ratios of at least 10:1 or more according to Storr. The reason is that defeat is mostly a psychological rather than a physical condition. The ability to inflict surprise and shock is thus not mainly dependent on local material or numerical superiority but on the way the attack is carried out, in terms of *unexpected* timing, direction, method or means, or a combination of these.

So what are the implications of this? First, it gives hope to a smaller army. Second, and if we analyze current army handbooks for brigade tactics, for example, SwAF[93] we find that it does not seem to really reflect the importance of the surprise-shock-exploitation sequence. For example, this Swedish brigade handbook advocates the importance of four principles of war, in a logical system; *Freedom of action*, *Concentration of Force*, and *Surprise* should be combined in order to accomplish *Local superiority* at the point of assault. When studying the text further it is clear that the handbook advocates *physical superiority* (superior force ratios) rather than *psychological superiority* based on surprise-shock-exploitation. This is indicated in recommendations of preferable force ratios of at least 3:1 for an attacking force against a defending one.[92] And the Swedish

Army is not alone in this perception of the meaning of local superiority.[94] Could it be that the essence of *maneuver warfare* is still not fully understood?

What are the weaknesses of the maneuver warfare presented in this tentative model? One weakness is its fragmented character not including important support to maneuver warfare. This is visible for someone used to studying military handbooks and doctrines because our article does not cover the whole system, including logistics, engineering, command and control, and other important aspects of combat normally included in doctrines. It is not possible to cover all of this in an article, and it was not included more than as piece-meal in the literature we studied. Another weakness, perhaps more fundamental, is the problem for a relatively smaller force both to organize a maneuver force-element to execute *surprise-shock-exploitation*; and at the same time organize a holding or defensive force-element in order to delay or fix that part of the enemy force that cannot be dislocated, so it cannot preempt the maneuver force-element. Here the theorists are vaguer and, of course, this problem is highly dependent on the circumstances. Maneuver warfare seems to be inherently risk-prone and depends on something that cannot be reliably planned for in advance.

Finally, we will present how these results can be used in the training of officers. First, in order to train officers in how to conduct battle we need to have a good and empirically based idea about what effective tactics is. This is the first step and this article represents our attempt to do that. The next step is to implement these tactics in a specific combat scenario and see how the tactics can be applied. The third step will be to run two-sided computerized wargame[95] with officers to see if the application of the maneuver warfare aimed at accomplishing surprise-shock-exploitation is successful. If this is the case we want to continue by studying officers and command teams, to ascertain if the ability to successfully apply the tactics is correlated to some individual, team capabilities, or traits. This could potentially help us understand what factors contribute to "tactical ability" in military officers and command teams.

Notes

1. German WWII approach covering both the tactical and operational levels of German ground warfighting until 1945. This is still the theoretical basis in maneuver warfare including features such as mission-type orders (*Auftragstaktik*), decisive point, center of gravity (*Schwerpunkt*), and intent (*Absicht*). We have pointed out important parts from the German WWII warfare (mechanized) style in a model, although not flawless, in our discussion on victory in battle.
2. Carl von Clausewitz, *On War*, edited by J. Graham (Hertfordshire: Wordsworth Editions Limited, 1997), 141.
3. Truppenführung, *On the German Art of War*, translated and edited by Bruce Condell and David Zabecki (Boulder, CO: Lynne Reinner Publishers, Inc., 2001), 30–2.
4. Edward N. Luttwak, *Strategy: The Logic of War and Peace* (London/Cambridge, MA: The Belknap Press of Harvard University Press, 2001), 113.
5. Carl von Clausewitz, *On War*, translated and edited by M. Howard and P. Paret (Princeton, NJ: Princeton University Press, 1976), 128.
6. As pointed out by an anonymous reviewer, that translation is not exact and correct if compared to the original sentence. The problem being the word "teaches" since Clausewitz originally used the words "die Lehre." According to our anonymous reviewer, Clausewitz meant that tactics is a collection of learnings and lessons for the use of armed forces in battle. Clausewitz defined strategy as "the use of engagements for the object of the war."
7. Swedish Armed Forces, *Arméreglemente Taktik* [*Army Regulations: Tactics*] (Stockholm: Armed Forces Headquarters, 2013), 19 [in Swedish].
8. U.S. Marine Corps, *MCDP 1-3, Tactics* (Washington, DC: Department of the Navy, Headquarters United States Marine Corps, 1997), 3.
9. Harald Höiback, "Militärteoretisk idéhistoria [Military Theoretical History of Idéas]," in *Krigens vitenskap*, edited by H. Höiback and Palle Ydstebö (Oslo: Abstract Forlag AS, 2012), 78–119.
10. For example, Sweden, Norway, Denmark, Estonia, Latvia, Belgium, nations having one or maximum two brigades in their current armies.

11. Several countries (including Sweden) tend to describe their military warfighting capability as consisting of three components: the *conceptual*, the *moral*, and the *physical components* (i.e. Swedish Armed Forces, *Militärstrategisk doktrin – MSD 16* [*Military strategic doctrine*]. (Stockholm: Armed Forces Headquarters, 2016), 25; UK Ministry of Defence, *Joint Doctrine Publication 0-01 – UK Defence Doctrine* (Shrivenham: The Development, Concepts and Doctrine Centre, 2014), 25.
12. Höiback, *Krigens vitenskap*, 106–19.
13. Ibid., 112.
14. Stephen Biddle, *Military Power – Explaining Victory and Defeat in Modern Battle* (Princeton, NJ: Princeton University Press, 2004).
15. B. A. Friedman, *On Tactics: A Theory of Victory in Battle* (Annapolis, MD: Naval Institute Press, 2017) is influenced by the work of J. F. C. Fuller and B. H. Liddel Hart, *The Strategy Of Indirect Approach – Primary Source Edition* (Milton Keynes: Lightning Source UK Ltd., 1929); Fuller, J. F. C., *The foundations of the science of war* (London: Hutchinson, 1926); Höiback, "Vad är militärteori [What is Military Theory]," in *Krigens vitenskap*, edited by H. Höiback and Palle Ydstebö (Oslo: Abstract forlag AS, 2012), 31–77.
16. Friedman, *On Tactics*.
17. Including the Swedish Armed Forces, *Army Regulations: Tactics*.
18. Robert R. Leonhard, *Fighting by Minutes – Time and the Art of War* (Westport, CT: Praeger, 1994).
19. Randall Collins, "A Dynamic Theory of Battle Victory and Defeat," *Cliodynamics* 1, no. 1 (2010): 3–25.
20. Storr, *The Human Face of War*.
21. Luttwak, *Strategy: The Logic of War and Peace*, 103–17.
22. Collins, "A Dynamic Theory of Battle Victory and Defeat," 4–5.
23. Based on his analysis, Collins presented a comprehensive dynamic model of battle victory and defeat and concluded that in order to win it is important to accomplish an *organizational breakdown* of the opposing force. Collins, "A Dynamic Theory of Battle Victory and Defeat," 5–10.
24. Collins, "A Dynamic Theory of Battle Victory and Defeat," 9.
25. Ibid., 10.
26. Biddle, *Military Power*.
27. Ibid., ix.
28. Ibid., 35–45, 190–1.
29. Ibid., 48–51.
30. Storr, *The Human Face of War*, 49.
31. Rowland, D., Keys M. C., and Stephens, A. B., "Breakthrough and Maneuver Operations – Historical Analysis of the Conditions for Success" (MOD Defence Operational Analysis Centre Report R9412, October 1994).
32. Storr, *The Human Face of War*, 50.
33. Ibid.
34. Ibid., 198.
35. Ibid., 90–1.
36. Swedish Armed Forces, *Army Regulations: Tactics*, 69.
37. Leonhard, *Fighting by Minutes*, 13–31.
38. Ibid., 27–30.
39. Ibid.
40. Ibid., 47–8.
41. Biddle, *Military Power*.
42. Ibid., 35.
43. Ibid., 44. For defense, the elements are the same but differently applied.
44. Storr, *The Human Face of War*, 106–10.
45. Ibid., 108.
46. Leonhard, *Fighting by Minutes*, 91–105.
47. Storr, *The Human Face of War*, 110–1.
48. Leonhard, *Fighting by Minutes*, 34–9.
49. Storr, *The Human Face of War*, 110.
50. Ibid. Referencing Trevor Dupuy who analyzed over 200 battles, 119.
51. Ibid. 64.
52. Leonhard, *Fighting by Minutes*, 146–7.
53. Storr, *The Human Face of War*, 107–10.
54. Ibid. 109.
55. Ibid. 51, 109.
56. Friedman, *On Tactics*, 30–4.

57. Storr, *The Human Face of War*, 111–5.
58. Leonhard, *Fighting by Minutes*, 107–11; Friedman, *On Tactics*, 57–9; and Storr, *The Human Face of War*, 129–53.
59. Friedman, *On Tactics*, 112–8.
60. Leonhard, *Fighting by Minutes*, 115.
61. Ibid., 115–8.
62. Storr, *The Human Face of War*, 135.
63. Ibid. Storr is referring to Kiszely, Major General John, "The Meaning of Maneuver," *The RUSI Journal* 143, no. 6 (1998): 36–40.
64. Ibid., 134.
65. Ibid., 147–9.
66. Leonhard, *Fighting by Minutes*, 107–9.
67. Storr, *The Human Face of War*, 142–3.
68. Ibid., 123.
69. Friedman, *On Tactics*, 116–8; Leonhard, *Fighting by Minutes*, 155–62.
70. Biddle, *Military Power*, 44.
71. Storr, *The Human Face of War*, 50.
72. Ibid., 85–6.
73. Ibid., 85–6.
74. Leonhard, *Fighting by Minutes*.
75. Storr, *The Human Face of War*, 84.
76. Leonard, *Delaying Detection*, 135–48, *Hastening Contact*, 149–67.
77. Leonhard calls this "preemptive tactics," 157–8.
78. Leonhard, *Fighting by Minutes*, 162–5.
79. Ibid., 155.
80. Storr, *The Human Face of War*, 84.
81. Friedman, *On Tactics*, 70.
82. Storr, *The Human Face of War*, 87.
83. Ibid., 88.
84. Storr, *The Human Face of War*, 87; Friedman, *On Tactics*, 79.
85. Ibid., 68–9.
86. Friedman, *On Tactics*, 79.
87. Collins, "A Dynamic Theory of Battle Victory and Defeat," 9.
88. Ibid., 90–2.
89. Leonhard, *Fighting by Minutes*, 103.
90. Leonhard, *Fighting by Minutes*, 104–5; Biddle, *Military Power*, 40–2.
91. Storr, *The Human Face of War*, 105–6, 144–5.
92. Swedish Armed Forces, *Army Regulations: Tactics*, 38.
93. Swedish Armed Forces, *Army Regulations: Tactics*.
94. John Mearsheimer, "Assessing the Conventional Balance – The 3:1 Rule and Its Critics," *International Security* 13, no. 4 (1989): 54–89.
95. W. D. McKay, *The Mechanized Battlefield: A Tactical Analysis*, edited by J. A. English, J. Addicott, and P. J. Kramers (Washington, DC: Pergamon-Brassey's International Defense Publishers, 1985), 151–3. Low fidelity wargame as a research tool examines Canadian Army battalion and brigade development.

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