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FUNCTIONAL SEQUENCING:
The Third Dimension For the Air 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 Maritime Operations.

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

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19. ABSTRACT (Continue on reverse if necessary and identify by block number) This paper examines that portion of operational art known as "sequencing operations". More specifically, it develops the concept of "functional sequencing" and how the air planner may apply this. Traditional sequencing is linear in its application. Functional sequencing is non-linear and as such, provides an alternate way to order the employment of forces. This study approaches this investigation from both a theoretical and a historical perspective.			
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This paper examines the concept of sequencing and whether or not that concept has value for the air planner. Since the advent of the Goldwater-Nichols Department of Defense Reorganization Act of 1986, today's military finds itself compelled to utilize doctrine from "sister" services. Or so it seems. Clearly, the "Concepts of War" apply to any battle regardless of the medium in which it is being fought. But are the various tenets each service uses to fight interchangeable?

The notion of sequencing is one of these tenets. Specifically, it is an Army scheme for use in the land battle. This paper examines if this concept, which is used primarily in the two dimensional world of the ground combatant, is applicable to the three dimensional world the airman or sailor must deal with. In order to determine this, the concept of sequencing will first be explored. Then the idea of "functional sequencing," a method in which to apply a two dimensional strategy in the three dimensional arena, will be developed. To support this thesis, two case studies will be utilized. The first one is the air phase in Desert Storm. It serves to illustrate the advantages of functional sequencing. The other, the Battle of Britain from the German point of view, serves to illustrate a failure when functional sequencing is not applied.

Sequencing can be considered the principle process the practitioner of the operational art must contend with. Simply put, sequencing is the order in which the operational planner is going to apply combat forces to destroy the enemy and achieve the campaign objective. The need for sequencing came about because

the days of the single decisive battle ended about the time of Napoleon. Modern war has expanded in terms of time, space, and mass. The wars of Clausewitz's time took place in one or two square miles. The twentieth century has seen the entire globe embroiled in conflict.

In order to better grasp exactly what sequencing is, the writings of Mikhail Tukhachevsky are useful. Considered by many to be the father of modern operational art, much of his work deals with the rationale for sequencing during the campaign. Most of his work occurred shortly after World War I.

In Tukhachevsky's view, it was absolutely critical to sequence forces. Sequencing increases the magnitude of the forces in both time and space. In cases where the opponent is superior in strength, the only way to strike a decisive blow is to concentrate the forces available. By sequencing operations, the available forces are selectively concentrated in time and space.¹ This results in a tactical success which, when further exploited, translates into an operational advantage. This then, is a key concept. Tukhachevsky states that the purpose of sequencing operations is to "strike and destroy dispersed enemy battle and operational formations piecemeal by concentrating overwhelming manpower and equipment against individual units."²

Tukhachevsky also considered secrecy and speed of execution to be fundamental to success in a campaign of successive operations.³ He also felt that it was critical to create conditions which would enable destruction or defeat at a later time. This was his notion of conducting deep operations in time

for a future return.⁴

Tukhachevsky also discusses the importance of attacking those enemy elements which would produce the most decisive results and at the same time are most vulnerable.⁵ Although he doesn't label these elements, they are essentially the enemy's center(s) of gravity. Thus, he considers the enemy's rear area to become a goal for offensive operations, a task which is most easily accomplished through the application of airpower. He states that the destruction of those targets "would bring about a serious imbalance and a crisis if disrupted."⁶ With regard to planning he states, "One must outline the sequence in which the deployed enemy battle formations will be struck, i.e., one must combine the front and strength of the combined arms attack with the sequence of movements by bounds and reaching an area the possession of which determines the enemy's defeat."⁷

In essence, Tukhachevsky is discussing "decisive points." Field Manual 100-5 defines a decisive point as "a point, usually geographical in nature, that, when retained, provides a commander with a marked advantage over his opponent. Decisive points could also include other physical elements such as enemy formations, command posts, and communications nodes."⁸ Thus, ideally, the battle or engagement moves along a line of operation. It may move directly or indirectly towards the enemy's center of gravity. Usually, several objective points are reached on the journey toward the objective or center of gravity. One or more of these points could be a decisive point in which the advantage passes to the attacker.

This definition is based on Baron de Jomini's work, *The Art of War*. Jomini feels that the pinnacle of the operational art is the ability to bring one's force against the decisive points in the field of battle. Because of the magnitude of modern operations, it is necessary to have a series of simultaneous and/or sequential actions to achieve the final decision and these must occur along the decisive points on the battlefield.⁹

Thus, a method to plan and conduct the battle evolves. It moves along a line of operations toward certain predetermined objective points or decisive points culminating in reaching the center of gravity. It is inherently sequential and two dimensional in nature. And this is the heart of the matter as to why this concept is almost second nature to the foot soldier and almost foreign to the sailor or airman. The explanation has to do with the environment in which each warrior conducts operations and the way that environment is perceived. This perception results in a paradigm which can serve to limit the effectiveness of the operation.

The sailor and the airman view the world differently than does the soldier. The sailor and airman think in terms of the entire world, while the soldier thinks in terms of theaters, campaigns or battles. The soldier's perception is shaped primarily by the matter of geography. Ask a soldier about the importance of terrain, and you will discover it is everything to the soldier. However, ask a sailor or airman, and the most likely response will be it is something to avoid running into. To the soldier, it is the opponent that he must always face

regardless of who is the enemy and it is that fact around which the soldier must generate his plans.¹⁰

Once the soldier makes contact with the enemy and begins the battle, he wants to maintain contact with the enemy until the war is over. For if he loses contact with the enemy, he is at a disadvantage.¹¹ This then explains why the concept of sequencing is so important to the soldier.

The sailor, and to a greater extent the airman, find themselves much less restricted. To them, war is a series of encounters. They make contact with the enemy, engage the enemy, and then break contact. For the most part, they may choose when and where to fight. After the battle, they remove themselves from the area, regroup and prepare for another encounter. They will only engage in battle when it is mutually agreeable between the two combatants. The airman can participate in a dogfight one day, and bomb a factory the next. He can attack defensive missile systems in the enemy's capital and provide close air support to the soldier on the front. The sailor also can sink a ship on one day, and blockade a port on the next. The soldier can't do this. He is bound by his terrain. He must travel from one objective to another.

Rear Admiral J.C. Wylie identifies this capability possessed by the airman and the sailor in his book, *Military Strategy: A General Theory of Power Control*. He identifies this pattern of warfare as a "collection of lesser actions or individual actions...not sequentially interdependent."¹² He calls this a "cumulative strategy." He says this is a characteristic of air

warfare.

Thus, the doctrine of each service has evolved to fit the unique needs of each service. For the Air Force, that doctrine is contained in Air Force Manual 1-1, *Basic Aerospace Doctrine of the United States Air Force*. But today, that document has been influenced by the Army doctrine. Published in March, 1992, page one lists the principles of war. Now, the principles of war are applicable across the spectrum of combat regardless of the medium in which the battle takes place. The planner must be aware of the uniqueness of his own service and critically evaluate certain tenets of doctrine written or taught in the name of jointness. Furthermore, this must be done without parochial views clouding the planner's judgment. The planner must determine if the concept works in his/her environment. If not, the concept must be modified or discarded.

AFM 1-1 does not mention the concept of sequencing. Not even in chapter three, which is titled "Employing Aerospace Forces, The Operational Art," is there a discussion of sequencing. So, at least on the surface, it appears the concept must not be relevant to the employment of air power.

Likewise, JCS PUB 3-01.2, *Joint Doctrine for Theater Counterair Operations*, does not consider the concept of sequencing. Perhaps sequencing is not of value to the air planner. Perhaps the concept is too constraining and violates the airpower tenets of flexibility and versatility contained in AFM 1-1. "The unique flexibility and versatility of aerospace power should be fully used and not compromised. The ability to

concentrate force anywhere and attack any facet of the enemy's power is the outstanding strength of aerospace power."¹³ Thus, airpower is free to strike anywhere and anytime along the continuum of the battle (the line of operation). It can strike the enemy's lead attack unit or strike the enemy's rear.

Jomini, in his discussion of sequencing and the importance of striking decisive points in the application of the operational art, wasn't thinking of airpower. However, his discussion of striking deep into the enemy and the need to strike the decisive points dovetails nicely with airpower. Here is an intriguing point. While the linear sequencing of the soldier is not relevant to the airman, a non-linear sequencing could be extremely important. A sequencing based on function rather than geography could be a critical concept for the air planner. Indeed, although this functional sequencing is not specifically labeled, it is central to Air Force doctrine contained in AFM 1-1.

AFM 1-1 states, "The essence of aerospace operational art is the planning and employment of air and space assets to maximize their contribution to the combatant commander's intent."¹⁴ Current Air Force doctrine identifies four tasks which the air component commander must concern himself with. The first is envisioning the theater and determining when and where to apply what force in concert with the combatant commander. This first task is most closely related to the concept of sequencing. In essence, this is targeting. Targeting is the determination of where to apply force and what kind of force to

apply. However, unlike the ground commander, he must examine a greater area encompassing many more targets. He may choose to target the enemy's center of gravity, a decisive point or any other objective point within the theater.

The remaining three tasks, while not as closely related to sequencing as the first, are all critical to the successful employment of airpower and should be mentioned. The second task is ensuring that the units applying the force have the best chance of success. The third task is utilizing feedback and adjusting operations as necessary to ensure the current goals are achieved. This ensures the commander recognizes the dynamic nature of combat operations and the effect the enemy's reactions and counter moves play. The final task involves the exploitation of fleeting opportunities that from time to time present themselves. In each of these areas, the key lies in the ability of the air planner to achieve objectives by the proper functional sequencing of aerospace roles and missions so in the end, they produce a mutually reinforcing effect. Failure to do so, may result in the loss of the war.

Air Force doctrine recognizes the hierarchical order of these functions. Here, the concept of functional sequencing becomes relevant. The first priority in Air force doctrine is aerospace control with the ultimate goal being air supremacy. This includes both counterair and counterspace missions. This is exactly what was done in the Gulf War.

Using primarily airpower, the coalition forces isolated the Iraqi regime from the start of the war by destroying command

facilities, telecommunications and C³ systems. Once they had blinded the Iraqi leadership, they proceeded to gain and maintain air supremacy which resulted in unhindered air operations. They attacked radar sites, SAMs, and IADS control centers. They then destroyed Iraqi air forces and airfields.

Control of the aerospace permits and enhances the operation of both land, sea, and air forces. And conversely, it denies these same advantages to the enemy. Thus, this control becomes an enabling means rather than an end in itself. Other forces on both land and sea can contribute to this mission by attacking enemy bases or defending friendly bases.

Once this control is established, the commander may move on (functionally sequence) to the next role involving airpower. That role is force application or applying combat power. Typical missions are strategic attack, interdiction, and close air support. The freedom which aerospace control affords permits the air component commander to place combat power on the enemy whenever and wherever needed in order to obtain the objectives. Furthermore, he has the freedom to pick the time and place. Thus, he controls the tempo of the mission. This in turn serves to reduce risk. He may operate independently or in conjunction with surface operations. He also may operate at whatever operational level he chooses. These missions typically go against the enemy's center of gravity, command elements, war production assets and supporting infrastructure. Again, it is the fact that he has aerospace control which gives the freedom to carry out these missions. Without the aerospace control, ones

actions are severely limited. Risk is greatly increased with the corresponding decrease in mission effectiveness.

This was successfully done in the air phase of DESERT STORM. After air supremacy was established, coalition forces struck at nuclear, biological, and chemical sites. Military production and storage facilities were ravaged by bombs. Oil production and storage facilities were struck. Iraqi infrastructure was destroyed to further complicate their logistic tasks. Finally, elite Republican Guard units in the KTO were struck around the clock. All this done at a relatively low risk due to the possession of air supremacy by the coalition forces.

Next in the functional sequence of operations comes the force enhancement roles. These include the missions of airlift, air refueling, spacelift, electronic combat, surveillance and reconnaissance, and special operations. These missions not only improve operations, but may in fact be the only method of sustaining other operations. They serve to multiply combat effectiveness. These too are effected by the sequence of operations. If not for aerospace control of supremacy and the synergistic effects of strategic attack, interdiction and close air support, force enhancement might not be possible. Without these, sustainment of air supremacy might not be possible. Thus, each fosters an environment which supports the other. However, the order or sequence of operations in the theater is critical.

Finally, force support becomes important. Force support provides the ability to mount and carry on aerospace operations. The missions of base operability and defense, logistics, combat

support, and on-orbit support all depend on the previous roles of employing aerospace forces.¹⁵ Just as with the force enhancement role, force support relies on the previous roles for its survivability. In turn, it provides a benefit supporting the previous three.

Now let's examine the historical perspective. This perspective allows us to determine the validity of our theory and doctrine. It also allows us to better appreciate the importance of our own doctrine.

The Battle of Britain, which occurred from August through September 1940, serves as an example where failure to functionally sequence forces resulted in the first failure of German airpower.

In the conquest of Europe, German airpower had been quite successful. This was partly due to the limited capabilities of their adversaries, but also due to a successful doctrine. The well tried formula of annihilating the enemy's air force followed by the rapid advance of the German army coupled with direct air support would be used in the invasion of Britain as well. The German planners recognized that the first prerequisite which had to be met was the destruction of the Royal Air Force (R.A.F.) This would ensure German air supremacy and ensure the crossing of the English Channel by the German army could take place. And at this point, it equates with proper functional sequencing.

This then was the Luftwaffe plan. It consisted of two phases. The first was the elimination of the R.A.F., both as a fighting force and in its ground organization. The second was to

strangle the supply of Great Britain by attacking its ports and shipping. The first phase, the elimination of the R.A.F. was to be accomplished in two stages. The first stage involved the destruction of the fighter defenses located south of a line between London and Gloucester. In the second stage, the German offensive was to be extended northward until all of the R.A.F. bases could be attacked during the daylight. As a part of the same plan, a day and night bombing offensive was to be directed against the British aircraft industry.¹⁶ But it was in the application of the overall plan in which the planners began to make their mistakes.

During the opening stages, the Stuka dive bombers which had done so well in eastern Europe, were given the mission of closing the English Channel to all British shipping by day. Heavy bombers were to attack shipping and ports by day and night. The Germans also began sending fighters over England to test the response of the R.A.F. fighters. As British resistance began to mount and German losses increased, German intelligence learned of the British early warning radar system which was connected with fighter control. This major aspect of Britain's defense was neglected by the Luftwaffe and their commander, Reichsmarschall Hermann Goering, who did not want to hear of any serious opposition to the Luftwaffe. The German fighter commanders though, were beginning to realize the difficulty their Me.109 and Me. 110 were having against the British Spitfire and Hurricane. Thus, problems due to a failure to functionally sequence began to occur.

By mid-August, large scale bomber attacks on British fighter airfields had begun. The Germans continued bombing shipping and ports along with fighter production facilities. But the Luftwaffe continued to have problems obtaining reconnaissance information. And by the end of August, the British were still putting up a formidable resistance. Confused German leadership estimated British fighter strength anywhere from 100 to 1,000 aircraft.¹⁷ And even though their intelligence had reported the problem, the German leaders did not realize that the real R.A.F. shortage was in pilots.

Thus, by the end of August, 1940, the Luftwaffe had failed to create the conditions which would permit the invasion of England. And on top of that, on August 25, R.A.F. bombers had attacked Berlin and the surrounding area. An outraged Hitler ordered the revenge bombing of London. This action, more than any other, further prevented Germany's attainment of air superiority, causing additional assets to be diverted from a fighter role to a bomber role. On the 7th of September, German bombers attacked the docks of East London. They followed this with attacks on central London. The new goal became the demoralization of the British population. Through September, the British maintained an effective defense and German losses continued to mount.

By the end of September, serviceability of German fighter units had dropped to 68 per cent and the serviceability of the heavy bomber units was at 52 per cent.¹⁸ Clearly, if this drain continued at this rate, the Luftwaffe would find itself in a

serious situation. So by the beginning of October, 1940, the German Air Force was relieved to have to call off operations due to deteriorating weather. In effect though, the German Air Force had suffered its first defeat.

This defeat was the result of the German Air Force planners who failed to practice the operational art. More specifically, they failed to apply the principle of functional sequencing to their operations. Clearly, had they done so, they would have been in a much better position to carry out the invasion of Great Britain.

The German Air Force failed because of one primary reason. They never defeated the British air defenses and obtained air supremacy. This goal, was stated in the initial concept of operations and was correctly identified as being critical to the success of the invasion. But in the execution of the operation, this important step was muddled. The Luftwaffe should have attacked the British fighters first. They should have selected the proper weapon to apply the force with (i.e. not the slow maneuvering Me.110). Additionally, had they applied the concept of functional sequencing, airdromes, command and control sites, radar sites and communication nodes would have been targeted. Then the bombing of training bases and aircraft production facilities would have appropriately followed and this would have been a much more effective plan.

It is true that fighter bases and aircraft production facilities were attacked, but it was done rather haphazardly prior to having air superiority. Tukhachevsky states that when

the opponent is superior in strength, the only way to strike a decisive blow is to concentrate the forces available. Thus, the Germans should have concentrated their best fighter forces against the Spitfires and Hurricanes in order to defeat them. Whether or not they could have actually defeated the British is not germane to the argument. But if a successful counterair mission was accomplished, they could have continued with strategic attack, interdiction, and close air support for the invading forces. If it wasn't successful, the termination of operations would have limited further losses. The Germans might have paused to build the additional force required for success.

But instead, the Luftwaffe chose to begin the operation by attacking ships and ports! They flew inland to see who would engage them. They ignored the British command and control system and their use of radar. Then in what was the ultimate folly, Hitler ordered revenge attacks on the cities of Great Britain. They never properly sequenced their operation and as a result, they suffered defeat.

Thus, based on this evidence, functional sequencing is a critical concept for the air planner to practice and understand. The air planner's task is more complex than that of the land planner. The land planner's task is basically a linear one. His sequencing decisions will flow along the path he chooses on the way to his decisive points. Thus, occupying the high ground may be a decisive point for the army. But the air planner's task, as previously stated, is much more difficult. Because of the inherent nature of air operations, the operating area is larger

by magnitudes. Thus choosing the proper line of operation by the air planner, is extremely difficult.

But the task isn't as daunting when viewed from the standpoint of functional sequencing. And fortunately, AFM 1-1 is based on this concept (although it isn't call by that name) giving the air planner an excellent guide. Unfortunately, this doctrine isn't incorporated into any JCS publications relating to the employment of airpower. In all future campaigns, aerospace control will be key to the success of the land and sea forces. As we saw in the Gulf War, functional sequencing was a key element of victory. Conversely, in the Battle of Britain, the lack of aerospace control completely prevented the land and sea forces of Germany to embark on the actual invasion of Great Britain.

In order for the concept of joint operations to be successful, all planners of tomorrow's conflicts need to understand the doctrine of their sister services. When applicable, that doctrine must be incorporated into joint doctrine. Planners must shift their paradigms and seize a concept and use it to advantage. They shouldn't limit themselves through narrow-mindedness, rather tomorrow's challenges will require all the imagination and free thinking the planner can muster. The concept of functional sequencing is only one idea which deserves consideration by all air planners.

ENDNOTES

- 1 Goehring, Russell J., "Sequencing Operations: The Critical Path of Operational Art," School of Advanced Military Studies Monograph, Fort Leavenworth, Kansas: Command and General Staff College, 1 May 1987, p 5.
- 2 Tukhachevsky, Mikhail N., "New Problems in Warfare," 1931 Moscow, USSR, reprinted in *Readings in Soviet Operational Art*, 5 January 1987, U.S. Army Command and General Staff College, Fort Leavenworth, Kansas, p 29.
- 3 Ibid, p 29.
- 4 Ibid, p 17.
- 5 Ibid, p 11.
- 6 Ibid, p 13.
- 7 Ibid, p 26.
- 8 U.S. Army, FM 100-5, *Operations*, (Washington, D.C.: Headquarters, Department of the Army, June 1993), p Glossary-2.
- 9 Goehring, Russell J., "Sequencing Operations: The Critical Path of Operational Art," School of Advanced Military Studies Monograph, Fort Leavenworth, Kansas: Command and General Staff College, 1 May 1987, p 13-14.
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- 14 Ibid, p 10.
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