A Critique of The Boyd Theory – Is It Relevant to the Army?

A Monograph
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ABSTRACT

A CRITIQUE OF THE BOYD THEORY—IS IT RELEVANT TO THE ARMY?
By Maj Robert B. Polk, 68 pages

Col. John Boyd, USAF (Ret), famous for developing the OODA (Observe-Orient-Decide-Act) loop model, spent most of his adult life trying to convince the U.S. military establishment of the merits of his theory for maneuver warfare later called the Boyd Theory. With the exception of the Marine Corps, his message found only limited appeal. Most of the services incorporated his four-step model into their doctrine simply to help describe the military command and control process. In contrast, the Marine Corps accepted his completed thoughts as a theory of warfare and adopted it as the basis for their capstone operational philosophy.

This paper explores the complete theory espoused by Col. John Boyd in an attempt to uncover the true meanings behind the famous model. The intent is to determine what it is and whether it has any utility to Army operational philosophy.

This monograph begins with an exploration of the first question—what is the Boyd Theory? To many it is simply the OODA loop depicting the human behavioral cycle of decision-making. To others it is a description of command and control. To true believers, it is a profound theory of warfare. To answer this question, this study begins with a review of several primary source documents including Boyd's 1976 unpublished essay entitled *Destruction and Creation* to discern the basic elements of his theory. Building on this, the study explores the remaining unpublished primary source writings (slide presentations) that Boyd developed over a period of approximately 10 years to understand the completed form of his theory. After establishing a base knowledge of his theory, the study measures Boyd's ideas against those of several recent critics.

The monograph concludes that the Boyd Theory is primarily a conception of human interaction in conflict. As such, his ideas encompass both the process of command and control and the ideas behind maneuver warfare. More importantly, Boyd offers the broader conceptualizations of how to think about modern military operations. It is in this broader context that the Boyd Theory is best viewed. It offers useful perspectives to an Army in search of a comprehensive operational philosophy.

To begin with, the Boyd theory implicitly encourages a dynamic approach to strategic and operational thinking in the nature of *Gestalt*. This contrasts with the inherently analytical nature of Army planning and decision-making. While recognizing the necessity of analysis, Boyd expounds on current operational theory to further the role of synthesis as an enabler to intuition. It is perhaps this in-depth exploration of synthesis as the element of the Orientation phase in the OODA loop that represents his most profound contribution to the body of Army operational thinking. Synthesis is the key to a broader understanding of his ideas.

Synthesis, as a tool to help make sense of emerging realities, enables one to adapt appropriately to complex and uncertain environments. According to Boyd, doing this

faster than the enemy allows one to achieve the requisite advantage of getting inside an adversary's moral-mental-time cycle. Coupled with increased freedoms for subordinate decision-making, these operating approaches can combine to help friendly forces take advantage of the discontinuities of unforeseen and unfolding events. Contrary to popular critiques, the ability to out OODA an opponent while difficult to execute has application in the Army precisely *because* of the unique frictions of ground operations.

Predating Dr. Henry Mintzberg's writings in the *Rise and Fall of Strategic Planning*, Boyd also implicitly warns of the pitfalls in strategic and operational formulation. In true Clausewitzian fashion, Boyd cautions against the false notions of *predetermination* (Mintzberg) in operational thinking. Equally important, Boyd encourages aggressive engagement of elements in both the internal and external environments in an effort to stay outwardly focused. Boyd's insistence on the outward orientation contributes to the notion of staying properly plugged in to on-going operational realities while formulating future actions. In this sense, the Boyd Theory addresses Mintzberg's warning against *detachment* of forward-looking planners from the shifting sands of current operations. Boyd encourages constant repositioning of mental models to more quickly adjust and respond to emerging strategies than an opponent. This has the added affect of creating a mind-set more predisposed to fighting the opponent rather than the plan. Boyd's understanding of pattern recognition also supports well Dr. Gary Klein's encouragement of naturalistic or intuitive decision-making in time-sensitive situations. Boyd offers few practical guidelines but his logic is sound and his message is sorely under appreciated in the Army today.

Boyd also contributes to modern operational philosophy with his warnings against relying on hard data for solutions to military problems in what is essentially a human endeavor. This emphasis on the human aspects of conflict and competition so often lost in today's notions of C4ISR deserves special recognition.

As the Army gets smaller and learns to act faster and farther in more complex environments, Boyd's ideas offer great insights into dealing with adversity. The Boyd Theory is less a call for emasculation of current Army doctrine than a warning to resist existing inclinations. It is not whether the modern Army operational paradigm fails to provide a process for thinking through issues, it is the fact that it does that makes the Boyd Theory all the more attractive. By adhering to the process, Army leaders may fail to recognize and respond quickly to the important subtleties inherent in the ever-shifting realities of military operations. In the final analysis, the Boyd Theory as a major contributor to the modern maneuver warfare movement has even more to offer the Army at the turn of the century than ever before.

SECTION 1

INTRODUCTION—RELEVANCE AND IMPLICATIONS

Since his death in 1997, Col. John Boyd's (USAF Ret.) OODA loop theory of warfare has generated a revival of interest among military theorists and practitioners. His simple construct for conflict and competition resonates well with those in search of new paradigms for dealing with the impending complexity and dynamism of the twenty-first century. Yet, while some armed services embrace his theory as a viable operational concept, others continue to relegate Boyd's OODA loop (Observe, Orient, Decide, Act) to a simple tactical device for decision-making. This paper seeks to uncover the true meaning behind the design of Boyd's Loop in an attempt to determine its relevance to the Army's concept of operations.

The OODA loop found its genesis from observations of fighter pilot actions over the skies of Korea. Boyd theorized that the Americans' increased ability to observe, orient, decide, and act from the bubble-shaped canopy of their F-86 Sabre enabled them to defeat the superior Chinese-flown MIG-15's. The American pilots' ability to defeat an adversary through "fast transient maneuvers" formed the basis of his future theories on conflict. Building on this insight, Col. Boyd in retirement absorbed himself in the further study of military theory and history during a period of 15 years between 1977 and 1992. His basic theory developed into a concept summarized as follows:

> Conflict can be seen as time-competitive observation-orientated-decision-action cycles. Each party to a conflict begins by observing. He observes himself, his physical surrounding and his enemy. On the basis of his observation, he orients, that is to say, he makes a mental image or "snapshot" of his situation. On the basis of this orientation, he makes a decision. He puts the decision in to effect, i.e., he acts. Then because he assumes his action has changed the situation, he observes again, and starts

> the process anew...With each action, the slower party's action is inappropriate by a larger time margin. Even though he desperately strives to do something that will work, each action is less useful than its predecessor; he falls farther and farther behind. Ultimately, he ceases to be effective.[1]

In the end, he concluded that the OODA loop applied equally well to ground combat as to air-to-air maneuvers. This not-so-subtle shift from tactical fighter pilot metaphors to operational and strategic theory found its voice as the "Boyd Theory."[2] As an extension of the OODA metaphor, the Boyd Theory along with the German example became the backbone of the modern maneuver warfare movement.

Never attempting publication, Boyd instead developed a compelling five-part series of briefings he called *Discourses on Winning and Losing* to convince audiences of generals, politicians, scientists, journalists, and academics of the full merits of his theories for ground combat. The world of military theorists took notice. One in particular, William S. Lind, former advisor on military affairs for U.S. Senator Gary Hart and President of the Military Reform Institute, noted his enthusiastic support of Boyd's ideas in his book, *Maneuver Warfare Handbook.* Lind codified Boyd's theory into practical application specifically tailored to the Marine Corps. Citing Boyd's observations of ground conflict from Leuctra to Vicksburg and the Ardennes, Lind promulgated his own theory of maneuver warfare imbued with the Boyd Theory and the German example. He argued in general terms that future ground combat would be dominated by those who could decentralize their actions, accept confusion and disorder while avoiding all patterns and formulas of predictive behavior.[3] These would combine to generate abilities to "out-OODA" the enemy.

The Marine Corps whole-heartedly embraced the idea of winning in the time-competitive observation-orientation-decision-action cycle, recognizing the advantages it could bring to a service which often fought first and outnumbered. Major General A. M. Gray as Commandant of the Marine Corps made it official when he adopted William Lind's interpretation of Boyd's maneuver warfare theory as Marine Corps doctrine and guaranteed its publication in FMFM 1 *Warfighting*.[4] The current Marine Corps capstone manual, MCDP 1, gives equal if not greater attribution to Boyd's ideas.[5]

This assimilation of the Boyd Theory by the services has not been limited to the Marine Corps. The Navy and Air Force combine efforts in addressing the OODA loop in varying ways and degrees. The Navy's manual on command and control, NDP 6, explicitly states that the naval commander's decision and execution cycle is the OODA loop. The manual goes on to depict a two-sided OODA loop model relating enemy and friendly decision cycles. Interestingly, of all the services, the Air Force seems the least interested in incorporating Boyd's theories into its doctrine. The Air Force defines the OODA as a theory "*contending* [the author's emphasis] that one can depict all rational human behavior, individual and organizational, as a continual cycling through four distinct tasks: O-O-D-A."[6] With this, the Air Force consigns the Boyd Theory to that of social science rather than a fighting doctrine. Its capstone operational doctrine, AFDD 1, gives but brief reference to the OODA and only in the context of using information dominance to support this cyclical behavior. In a contrasting perspective, LTC David Fadok argues that the theories of both Boyd and Col. John A. Warden have formed as complimentary concepts and in fact, manifest themselves equally in the very fabric of Air

Force operational philosophy.[7] Regardless of the particular bias, few can disagree that the Boyd Theory continues to influence sister service doctrine.

In contrast to the Navy and the Marine Corps in particular, Boyd's OODA loop finds only occasional explicit reference in Army doctrine. According to its lead writer, the 1999 draft FM 100-34, *Command and Control*, is the first and only Army field manual to depict Boyd's ideas in the main body of its text. Even so, the FM only briefly notes that the OODA loop, "demonstrates the validity and need for accomplishing the multiple cycles in deciding and acting before the enemy can effectively react to friendly actions."[8] Interestingly, the FM goes on to warn, "there are some cautions to applying it directly to land forces...it vastly simplifies an extremely complicated process..."[9] The Army seems purposely out of step with other services in application of Boyd's theory. As we will see, however, this is more perception than reality.

The Boyd Theory and it more famous cousin, the OODA loop, are no strangers to critics led by land warfare proponents who resist the notion of simplistic approaches to operations in ground combat. Army Captain Robert L. Bateman, in a recent rebuttal to Boyd's land warfare enthusiasts, suggests that the weakness of the OODA loop lies in its misunderstanding of the unique complexities and friction of ground operations. Bateman argues that armies rarely make singular "observations" about the enemy from perfect and direct intelligence as a fighter pilot might from a cockpit. Moreover, Bateman insists that operational-level Army commanders can never directly initiate "actions" against an opponent but rather must issue directions to subordinates that set off OODA cycles at lower levels.[10] The writers of FM 100-34 agree and quote Bateman as further evidence as to the limited utility of the OODA loop in Army doctrine.

The challenge in accepting Boyd's ideas often stems from difficulty in defining what his theory represents. References to it as either the Boyd Theory or the OODA loop adds to the misunderstanding. LTC David S. Fadok attempts to ameliorate the situation when he writes,

> Boyd's theory of conflict advocates a form of maneuver warfare that is more psychological and temporal in its orientation than physical and spatial...[His] theory of maneuvering inside the enemy's mental process, as depicted by the OODA loop model is more philosophical, abstract, and nonlinear. He recognizes the uncertainty of war and the subsequent need for mental agility and creativity—in short, genius. [11]

This statement begins to describe the essence of Boyd's contributions to modern military theory. Boyd himself would likely suggest that any interpretation derive primarily from his theories about maneuver warfare. Command and control and decision-making are subordinated to these maneuver concepts. In a Clausewitzian sense, Boyd would also likely characterize himself as someone interested in the heuristic rather than prescriptive Jominian approach to warfare theory. As did Clausewitz, Boyd may have understood:

> No prescriptive formulation universal enough to deserve the name of law can be applied to the constant change and diversity of the phenomena of war...Theory should be studied not doctrine...It is meant to educate the mind of the future commander or, more accurately, to guide him in his self-education not to accompany him to the battlefield.[12]

Unfortunately, this less than definitive approach leaves the Boyd Theory open to functional misinterpretations.

Following Boyd's death, in a farewell article in honor of his friend and compatriot of 27 years, Franklin Spinney addressed other popular misconceptions and criticisms regarding the simplicity of the OODA loop and those who questioned its relevance. He illuminated the sophistication behind the OODA construct by reiterating the claim that

the "key to appreciating the power of Boyd's idea is to understand why the Orientation function is the door through which a competitor can penetrate his opponent's decision cycle." [13] According to Spinney, Boyd understood that an individual or group uses mental models to orient to the external environment. Consequently, Boyd believed that the strength of the OODA was in its ability to destroy the enemy's paradigm of reality, while simultaneously denying him the opportunity to *synthesize* a new paradigm (creating new patterns of knowledge when existing patterns do not permit the understanding needed to cope with novel circumstances).[14] For Boyd, time and space seemed relative leaving plenty of room for exploiting enemy decision-cycles. As he analyzed ground operations, he concluded that the inherent friction of ground combat actually helped to set up advantageous friendly situations for such exploitations.

Boyd still attracts critics and advocates each with their own perspective on what he said and what they want to add. Yet it is helpful as a point of departure to note that John Boyd at least acknowledges one thing his basic ideas were not. They were not all new. In the opening of his presentation, *Organic Designs for Command and Control*, Boyd quoted no less than seven prominent historical figures from Sun Tzu to Nathan Bedford Forrest of their versions of "gittin thar the fustest with the mostest." The idea of acting in time and space faster and farther than the enemy has been a mainstay in the annals of military operations. Boyd never pretended that the basic ideas were new but he felt the times demanded an elaboration and extension of the root ideas into modern and practical adaptations of the theory. He found a message imbedded within the great thoughts of the past and an audience eager for new perspectives. Such an audience was found at the 1996 Cantigny Leadership Conference at the Army War College. Here,

experts interested in discerning the best model for decision-making for Army leaders in the twenty-first century debated the merits of Boyd's OODA loop with other prominent theories. Billed primarily as a method for decision-making rather than a comprehensive warfighting concept, the OODA loop nevertheless piqued interests and demonstrated the extent to which Boyd's theory had infiltrated Army centers of thought.[15]

Whether a construct of maneuver warfare, a method of command and control, or a decision-making process, Boyd's simple model belies its sophistication. As it experiments with such future warfighting concepts as the Army after Next's *Strategic Preclusion* using dominant battlespace knowledge to win quick decisive campaigns, the Army can ill-afford to quickly dismiss any new ways of thinking about complexity.[16] The review of Boyd's discourses seeks to reveal the true essence of his ideas in an effort to determine the proper influence of his theories on Army operational thought. In the final analysis, the Boyd Theory may prove substantial or insubstantial but it does deserve a second look. This monograph seeks to provide just such a second look from an Army perspective.

SECTION 2

SETTING THE STAGE: JOHN BOYD'S THEORIES ON CONFLICT AND COMPETITION

John Boyd never published his works. Reportedly, Boyd felt that the public might misinterpret his ideas in their present state of on-going development.[17] He captured his thoughts instead on slide presentations with which he eagerly entertained audiences in the 1980's and early 1990's. The Marine Corps University Research Archives in Quantico, Virginia proudly houses his original documents, many of which include these

slide presentations signed and dated on the coversheets in Boyd's own handwriting. His most ambitious document, *Discourses on Winning and Losing*, dated 1987 includes a compilation of his seminal works such as *Patterns of Conflict,* and *Organic Design for Command and Control.* In each, he elaborates on his earlier ideas espoused in his 1976 essay entitled *Destruction and Creation.*

Because of his reluctance to publish, there exists a scarcity of public knowledge on the ideas behind the well-publicized OODA loop. To many, the model depicted below and its call for observing, orienting, deciding, and acting faster than the opponent is all they will ever know about the theory and the man who made it famous. [18]

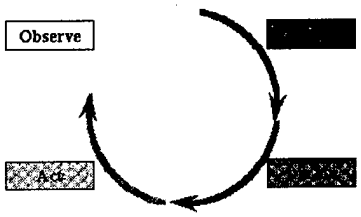

Figure 1

Few realize that his ideas continued to evolve, as did the model of the OODA itself. By the early 1990's the model depicted in figure 2 represented Boyd's final attempt to convey his ideas visually.

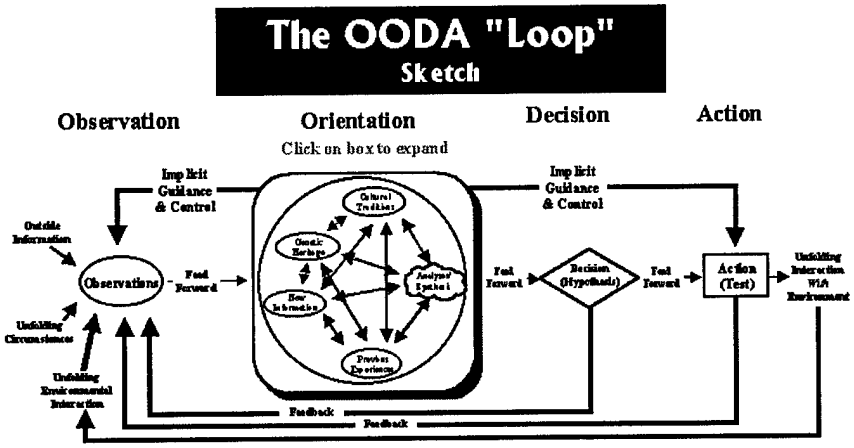

Figure 2

Even the services that revere his contributions fail to trace publicly the intricacies behind his simplistic model but perhaps for good reason. His rather eclectic discourses on conflict and competition spanning the range of human endeavors from man's basic survival instincts to the Indeterminacy Principle of Werner Heisenberg challenge modern doctrine and its desires for easy reading. Yet in spite of Boyd's unpalatable presentation, the fact that he has influenced the services remains undisputed.

As noted, Boyd influenced each of the sister services in one way or another over the years. Even the Army felt the impact of his ideas although seemingly loath to admit it. In 1986 the Army adopted a definition of agility as one of the four tenets of operations in its maneuver-oriented Air Land Battle doctrine which still stands to today.

> **Agility** is the ability of friendly forces to react faster than the enemy…It is as much a mental as a physical quality. Greater quickness permits the rapid concentration of friendly strength against enemy vulnerabilities. Forces may need to concentrate repeatedly so that by the time the enemy reacts to an action, another has taken place, disrupting the enemy's plans and leading to late, uncoordinated, and piecemeal response. This process of successive concentration against locally weaker or unprepared enemy forces enables smaller forces to disorient, fragment, and eventually defeat much larger opposing formations.[19]

What the reader may not recognize is how this definition exemplifies the extent of John Boyd's influence on modern Army operational thought. In his 1986 presentation, *Patterns of Conflict*, Boyd outlines on chart 132, how one could operate inside the adversary's OODA loop or get inside the enemy's Mind-Time-Space to: "1) Employ a variety of measures that interweave menace-uncertainty-mistrust with tangles of ambiguity-deception novelty as a basis to sever an adversary's moral ties and disorient..., 2) Exploit, rather than disrupt or destroy, those different frictions, and obsession of an adversary organism that interfere with his ability to cope..., 3) Generate uncertainty, confusion, disorder, panic, chaos...to shatter cohesion, produce paralysis and bring about collapse."[20] These became the ideas behind the term *Agility* used in today's lexicon of modern Army doctrine representing only a small measure of Boyd's contributions to the Army of today.

In his book, *In Pursuit of Military Excellence*, Shimon Naveh describes Boyd's influence on Army doctrine as even more profound. Naveh credits Boyd as the intellectual leader of the group of civilian military activists known by many in 1970/80's as the "reformers."[21] Naveh reports that Boyd's main contribution to these reformers who would formulate the future Airland Battle doctrine,

> ...concerned his conception of the operational principles of the relational maneouvre: disruption of synergy among the elements combining the rival system; simultaneous engagement of the operational components, structured hierarchically along the entire depth of the opposing system; and development of operational momentum exceeding the relative reaction capability of the rival system.[22]

Furthermore, Naveh proclaims that these ideas were interpreted almost literally into all four basic tenets comprising the conceptual skeleton of the Airland Battle doctrine,

namely: initiative, agility, depth and synchronization. (As a footnote, William Lind would disagree that Boyd ever endorsed synchronization. In fact, he contends that Boyd actually detested the very idea of trying to bind combat into process and order.) In any case, the question remains not whether Boyd has influenced Army doctrine but to what extent should his ideas continue to influence it in the future.

Destruction and Creation

To appreciate Boyd's theories fully, one must begin with an examination of his originating document entitled *Destruction and Creation.* Here, Boyd lays the foundation for his ideas leading to theories on warfare. Boyd begins it all with a reflection on human behavior and an assertion that "actions taken as individuals are closely related to survival."[23] With this very basic premise, he suggests that this means being able to act freely in ways independent from debilitating external influences. This leads one to conclude that a basic aim of an individual or group is to "improve their capacity for independent action."[24] The real world is full of cooperation and competition making timely *actions* and *decisions* fundamentally important. "To make timely decisions one must be able to form mental concepts of observed reality, as we perceive it, and be able to change these concepts as reality itself appears to change. The concepts can then be used as decision-models for improving one's capacity for independent action."[25]

Boyd hypothesizes that there are only two ways to manipulate mental concepts to represent observed reality. "We can start from a comprehensive whole and break it down to its particulars [general to specific also known as deduction, analysis, and differentiation] or we can start with the particulars and build towards a comprehensive whole [specific to general also known as induction, synthesis, and integration]."[26]

According to Boyd, these two opposing *idea chains* form the basic thought processes necessary for dealing with the certain chaos of the world in which we live.

In an attempt to link the ideas of deductive and inductive methods of observing reality to the ideas of attacking an adversary's *mind-time-space* later espoused in his OODA loop theory, Boyd introduces his terms of Destruction and Creation. Boyd believes that one's objective should be to act in a manner which destroys an adversary's ability to see reality (***destruction*** of a domain or breaking the whole into its respective constituent elements) before he can collect linking elements to recreate a new and improved observation (***creation*** of new perceptions of reality through specific to general induction, synthesis, and integration of common qualities or attributes found in the chaotic world). The side that executes this process faster and more accurately will win. Boyd emphasizes that this process of creation or *constructive induction* begins with the necessary destruction or unstructuring of the old domain for both enemy and friendly forces. This destruction frees the observer to create new perspectives rather than simply recreate the same old paradigms. This process brings with it the consequence of inevitable mismatches between ever new observations and the observer's most recent existing mental model. Boyd uses specific theories from the world of mathematics and logic to highlight this anticipated mismatch and further explain how the destruction and creation process helps resolve the dilemma.

In 1931, Kurt Goedel proved in his postulate on incompleteness and consistency that any conceptual system is logically incomplete. He revealed that there are true statements or concepts within the system that cannot be deduced from the postulates that make up the system. He then proved even though such a system may be consistent, its

consistency cannot be demonstrated within the conceptual system itself. To Boyd this meant, "...in order to determine the consistency of any new system, one must construct or uncover another system beyond it. Over and over this cycle must be repeated to determine the consistency of more and more elaborate systems..."[27] For Boyd, consistency equated to the character or nature of a system. If one could not understand the nature of the system it was observing, disorder, chaos, and uncertainty would overwhelm the observer. Boyd used Goedel's Proof to suggest that one must orient outside of one's present mental model to achieve an enlightened perspective of reality. The process of matching up one's mental models with observations of reality is further complicated by the fact that humans use the same powers of observation to formulate new mental models while using existing models to shape future powers of observation.

> Under these circumstances, a concept [mental model] must be incomplete [idea taken from Goedel] since we depend upon an ever-changing array of observations to shape or formulate it. Likewise, our observations of reality must be incomplete since we depend upon a changing concept to shape or formulate the nature of new inquiries and observations.[28]

According to Boyd, the differences in time between the observations of reality and our mental models will always create a mismatch. Destruction and Creation eliminate this gap between observations of reality and existing mental models.

Adding to Goedel's insights, Boyd combines the theories of Heisenburg's Indeterminacy Principle[29] and the Second Law of Thermodynamics[30] to support the idea that "any inward-oriented ...effort to improve the match-up of concept with observed reality will only increase the degree of mismatch."[31] He uses these theories to argue that the uncertainty and related disorder associated with a closed-system can only be overcome by creating a higher and broader more general concept to represent reality

through the dialectic cycle of destruction and creation. For Boyd, this analytic/synthetic process is a natural manifestation regulated by the continuous effort to survive and improve one's capacity for independent action.

The ideas expressed in *Destruction and Creation* truly underpin the entirety of Boyd's theories on warfare. Later, in his elaboration in *Discourses on Winning and Losing*, the notion of OODA takes form with the ideas of destruction and creation as the engine behind the all-important Orientation phase of the process. Understanding this allows one to begin exploring the deeper meanings behind the ideas.

Patterns of Conflict

In 1986, Boyd presented the first of his *Discourses on Winning and Losing*, in which he intended, "to unveil the character of conflict, survival, and conquest."[32] Although a lengthy and sometimes difficult journey through the worlds of capitalism, technology, and the conduct of war, Boyd manages to reveal many of the underpinnings of his OODA loop as a theory of operations. He reminds the reader in his opening charts that his point of departure is the air to air fighter metaphor. This metaphor exemplifies the idea of operating at a faster tempo to "get inside the OODA time cycle or loop" of an adversary. He emphasizes that, "such activities will make us appear ambiguous thereby generate confusion and disorder among our adversaries - since our adversaries will be unable to generate mental images or pictures that agree with the menacing as well as faster transient rhythm or patterns they are competing against."[33] Building on these ideas, Boyd uses history and theory of war to further develop his thoughts on maneuver warfare and expand the influence of the OODA cycle.

While inclusive of many historical perspectives, the Boyd Theory draws heavily upon the lessons learned from the German experiences in WWII. Boyd argues that modern maneuver warfare as expressed through the OODA cycle magnifies friction and induces paralysis through dislocation of enemy forces much like the execution of Blitzkrieg. Success in competition depends on simultaneously sustaining tempo while "abruptly adapting to changing circumstance without losing cohesion or coherency of the overall effort."[34] The principles involved in managing this challenge are central to Boyd's ideas.

Clearly for Boyd, part of the "character of conflict, survival, and conquest" includes the generation and management of tempo. To him this seems a foregone conclusion but he understands that many still question the practicality of accomplishing this in large, complex organizations. An organization risks failure by inappropriately responding at every level to the competing and often overlapping OODA phases. In response, Boyd counsels that the time needed to complete an OODA cycle increases with each ascending level in the decision-making hierarchy as the number of events one must consider correspondingly increases. Consequently, subordinate levels must harmonize their work within the higher's slower rhythm and larger pattern to maintain consistency in the system. Higher, in turn must "give lower commanders wide freedom, within the overall Mind-Time-Space scheme to shape and direct their own activities so that they can exploit faster tempo/rhythm at tactical levels..."[35]

The key to harmonizing the commander's intent and mission with subordinate action is the articulation of the *Schwerpunkt*. To Boyd *Schwerpunkt,*

> ...represents a unifying medium that provides a directed way to tie initiative of many subordinate actions with superior intent as a basis to diminish friction and compress time in order to generate a favorable mismatch in time/ability to shape and adapt to unfolding circumstances.[36]

Lind describes it as the commander's bid for a decision and adds, "It is not just the main attack (though the main attack is often at the *Schwerpunkt*). It is a conceptual focus, not just a physical one."[37] All subordinate units adjust their action whether directly or indirectly, to support the *Schwerpunkt*. The ensuing harmonizing effect of the *Schwerpunkt* provides the necessary focus needed to operate at increased tempos.

The ideas behind the generation and management of tempo are often misunderstood. Boyd argues that most military theories miss the whole idea behind variety/rapidity/harmony/initiative as the basis to shape and adapt to circumstances—a necessary requirement for success in the uncertain and ever-changing environment of conflict or war."[38] Collectively, these characteristics form the basis of successful operations. They are a grouping of qualities that when acting together improve the ability to minimize one's own friction through *initiative* at the lower levels *harmonized* by a shared vision of a single commander. To maximize the opponent's friction, one must attack with a *variety* of actions executed at the greatest possible *rapidity*. By steadily combining these complimentary actions, one may reduce an opponent's mental and physical capacity to resist. Said another way; this enables one to,

> Operate inside an adversary's observation-orientation-decision-action loops to enmesh the adversary in a world of uncertainty, doubt, mistrust, confusion, disorder, fear, panic, chaos...and/or fold an adversary back inside himself so that he cannot cope with event/efforts as they unfold.[39]

If destruction and creation act as the engine, the variety/rapidity/harmony/initiative process forms the framework for the completed ideas on Boyd's maneuver warfare theory.

Boyd concludes details a comparative list of Principles of War from several countries to argue that the inconsistencies among them prove there are no immutable principles of war. Boyd concludes that his ideas of destruction and creation help "collect appropriate bits and pieces and assemble them in a coherent way to present a more satisfying picture."[40] This, according to Boyd, offers a convenient alternative to the over-reliance on static principles to guide action.

Organic Design for Command and Control (C2)

In 1986 Boyd also completed a slide presentation entitled *Organic Design for Command and Control*. Building on previous observations in both *Destruction and Creation* and *Patterns of Conflict*, Boyd describes the unique C2 philosophy associated with his maneuver warfare theory. This unique philosophy centers on C2 as a human rather than a technological endeavor. Boyd worries that the explosion of technology in the information revolution risks overshadowing the human dimensions of C2 in favor of hardware solutions. Consequently, he argues for a command and control system that focuses on what he calls the organic aspects of C2.

He begins with a reminder that all successful maneuver operations must address the functions of variety/rapidity and harmony/initiative. These functions cannot exist without a command and control process that harnesses the potential of these competing yet complimentary concepts. The Orientation phase of the OODA cycle is the key to actualizing these ideas.

As detailed earlier, Boyd considers the Orientation as the critical phasing of the OODA process. He now adds,

> ...without orientation there is no command and control worthy of the name...Orientation shapes the way we interact with the environment—hence the way we observe, decide, and act.[41]

With proper orientation, individuals and organizations may develop a common shared understanding (CSU) of operational situations. CSU once developed, guides action in ways that free subordinates to use both variety and initiative. The CSU also helps to reduce friction by harmonizing action with the shared vision. As the dissemination of common mental images or patterns increases, so does the opportunity for building bonds of trust within the organization. This increased trust can lead to using implicit rather than explicit communication. In mature organizations, this implicit communication helps form a C2 system "whose secret lies in what is unstated or not communicated to one another..."[42] CSU and implicit communication combine as Boyd's Implicit Orientation.

> Implicit Orientation allows commanders and their subordinates to: Diminish their friction and reduce time, thereby permit them to: Exploit variety/rapidity while maintaining harmony/initiative, thereby permit them to: Get inside an adversary's O-O-D-A loops, thereby: Magnify an adversary's friction and stretch-out his time for a favorable mismatch in friction and time, thereby: Deny an adversary the opportunity to cope with events/efforts as they unfold.[43]

This idea of implicit orientation becomes the enabling element of Boyd's command and control philosophy. The final portion of his presentation attempts to extend these ideas into a practical definition of command and control itself. For a more in-depth discussion of the relationship of the Boyd Theory with modern doctrine and theory on command and control, see Appendix A, *C2 and The Boyd Theory*.

SECTION 3

THE BOYD THEORY IN ACTION

This section presents at once the strengths and weaknesses of John Boyd's arguments. Here we explore the essence of his theory and challenge it with thoughtful discourse from critics and proponents. As a modest disclaimer, it is helpful to remember that Boyd never intended to prescribe applications of his theories. Recognizing the evolving nature of warfare, he like so many theorists in the Clausewitzian tradition believed prescriptive theory useless and felt content to leave application to strategists. It is also worthwhile to note that Boyd's central message developed through years of reflection and discussed here, focused primarily on the broader ideas behind maneuver warfare--his thoughts about command and control notwithstanding. He recognized C2 as supportive if not inseparable to the understanding and application of maneuver warfare but only as a part of a holistic equation.

Maneuver Warfare

Maneuver warfare is difficult to define succinctly but the characteristics are understandable and distinguishable from other approaches. Nothing in Boyd's *Discourses on Winning and Losing* suggests that he even used the phrase himself. William Lind may be credited with contemporary promulgation of the phrase but the qualities of maneuver warfare unmistakably derive from Boyd and the German example. This section attempts to make sense of it all.

John Antal summed up the modern debate on the future of maneuver warfare this way:

> Opponents of maneuver theory argue that maneuver theory is all "smoke and mirrors," that maneuver warfare is a concept that can only be portrayed in a historical context and is used by victors to explain how they defeated their dull-witted opponents. Fans of maneuver warfare theory argue that the Germans had the right idea in their concept of Auftragstaktik. Maneuverists call opponents of maneuver theory "attritionists"...The debate over maneuver warfare is an important exercise. The answer to this debate will set the foundation for the U.S. Army of the 21st Century.[44]

Even a quick review of the literature on maneuver warfare suggests general agreement with Antal's assessment. In this classic debate, some still argue in favor of treating both attrition and maneuver theory as necessary and complimentary while others abhor even the continued inclusion of the word "attrition" in the official lexicon of the Army. Some argue for radical and bold cultural shifts for true implementation of *Auftragstaktik* or mission command while others suggest the present model of centralized planning and decentralized execution is sufficient. Familiarity with these and other such aspects of maneuver warfare in light of John Boyd's contributions is the focus of the following.

As noted earlier, many of Boyd's conclusions on maneuver-oriented warfare stem from his analysis of German operations in WWII. For Boyd, the most important lessons came from his understanding of the German operational philosophy and not their tactics. Summed up by German General Guerth Von Blumentritt, this operational philosophy struck at the very core of Boyd's ideas on warfare. Blumentritt said, "The entire operational and tactical leadership method hinged upon...rapid, concise assessment of the situation...quick decision and quick execution, on the principle: 'each minute ahead of the enemy is an advantage.'"[45] In his own words, Boyd believed that the German philosophy based upon a "common outlook and freedom-of-action, and realized through their concepts of mission and *Schwerpunkt*, emphasized implicit over explicit

communication." He believed this allowed the Germans to exploit lower-level initiative while realizing higher's intent. In other words, the Germans repeatedly operated inside their opponents' OODA loops.

It would be wrong to leave the reader with an impression that Boyd only considers the German operational philosophy of WWII in his conclusions on maneuver warfare. Boyd understands well the Clausewitzian view of the unique nature of every war. In an effort to address the broadest range of theory on conflict and competition, Boyd analyzes the ideas behind guerilla warfare. His observations here push his own theory of warfare far beyond that of mere maneuver philosophy.

In contrast to more popular opinion, Boyd believes that guerilla wars bare great similarities to maneuver warfare rather than pose intractable differences. In his assessment of guerilla warfare, he argues that the essence of the guerilla idea is to,

> Defeat existing regime politically by showing they have neither the moral right nor demonstrated ability to govern and militarily by continuously using stealth/fast-tempo/fluidity-of-action and cohesion of small bands and large units in cooperation with political agitation/propaganda team as basis to harass, confuse and ultimately destroy the will or capacity to resist.[46]

In other words, the strength of guerillas lie in their ability to penetrate an opponent's moral-mental-physical being and generate moral-mental-physical non-cooperative centers of gravity while shaping their own environment and attracting more to their cause. He further argues that the keys to successful guerilla operations lie in, 1) dispersing and avoiding strength, 2) concentrating to destroy isolated factions, and 3) shifting efforts to gain and keep the initiative.[47] Both blitzkrieg and guerilla warfare similarly embrace the ideas of avoiding strength and "exploit subversion, surprise, shock, and seizure to

generate confusion, disorder, panic, etc., thereby shatter cohesion, paralyze effort, and bring about adversary collapse."[48] Boyd's view of both high and low intensity conflict harmonized well with more conventional theories of warfare and his ideas of "out-OODA-ing" an opponent.

Satisfied with the confluence of philosophy expressed through Mao and Blumentritt, Boyd concludes that the essence of *maneuver conflict* [his term] is to,

> create, exploit, and magnify ambiguity, deception, novelty, fast transient maneuvers to create disorientation, disruption, and overload...[This process combines with the aim to], generate many non-cooperative centers of gravity, as well as disorient, disrupt, or overload those that the adversary depends upon, in order to magnify friction, shatter cohesion, produce paralysis, and bring about his collapse.[49]

By encompassing a wide range of military operations, Boyd hopes to legitimize his ideas on maneuver conflict and expand it into a comprehensive theory for maneuver warfare.

Reflecting on the ideas espoused in *Destruction and Creation*, one may recall that Boyd's theory begins as an observation about the basic nature of man. Boyd posits that it is man's natural instinct for survival that is at the root of all conflict and competition. Since man's basic instinct has changed little through the course of history, Boyd believes that it remains a valid point of departure for theory on modern warfare.

Boyd also acknowledges that the essence of his theory finds its genesis deep in the annals of world history. Since the dawn of modern warfare, post-Westphalia in 1648, the great Captains of the eighteenth and nineteenth century demonstrated time and again the mastery of many of the rudimentary concepts of present day maneuver warfare. As an example, Frederick the Great based many of the actions in his campaigns on two insights both of which are key elements of modern maneuver warfare: "1) a keen

appreciation for the importance of operational tempo, and 2) a willingness to take risks in order to be strong at the decisive place and time."[50] These particular insights from one of history's most respected military practitioners helped form one the more important pillars of the Boyd Theory—the use of tempo.

It is this enduring element of tempo and the increased emphasis placed on it by Boyd that separates his theory of warfare from those of the past, according to William Lind. As noted in earlier discussions, this basic idea is not unique to modern warfare but Boyd's perspectives perhaps offer new insights into existing paradigms. To help the reader understand these new perspectives and the obvious challenges to each, Boyd begins by addressing the most obstinate question first: How can one be consistently faster than the enemy? At the strategic and operational level, Boyd believes that the answer lies in the art of fighting only when and where necessary to strike at the enemy's center of gravity. At the tactical level, units focus on "bypass and collapse" rather than "close with and destroy." The emphasis must remain on striking as directly as possible at the enemy's center of gravity at all times. Lind, a strong believer that war is more a contest in time than in space, claims that only in the past twenty years has this dimension of being consistently faster than the enemy surfaced as the most critical component of the maneuver warfare theory. It is truly at the root of the modern maneuverists' concept of warfare.

Boyd learned many other lessons from the past. He understood the historical progressive nature of war from the massed armies intent on the Napoleonic decisive strategies of annihilation to those of exhaustion in WWI. Reflecting on this same period he noted the evolution of warfare from the concentric to the dispersed operation

supported by the increasing mobility in the air, on land, and at sea. It is likely that Boyd looked ahead in the aftermath of the Cold War and Desert Storm with the same vision as he did post Korea and Vietnam. He understood that new political and resource realities were driving unprecedented changes. He also understood that the future would increasingly rely on smaller armies to do even more with less.[51] Boyd would embrace this future for it is precisely this dilemma of doing more with less that his theory and the ideas behind maneuver warfare propose to address.

Looking into this future, experts agree that the inevitable chaos and uncertainty of conflict generated by the natural friction inherent in complex operations will demand new, dynamic, and adaptable methods of warfare. Maneuver warfare enthusiasts posit Clausewitz's dictum, "in war everything is simple, but even the simplest thing is extremely difficult" as proof that ideas such as synchronization are useless paradigms for dealing with the future chaos.[52] They argue that terms like synchronization have led the Army in true Jominian style, to believe in an ability to prescribe order to warfare while the real world suggests otherwise.[53] Warfare must remain adaptable using conceptual tools such as destruction and creation to adjust actions to the changing environment faster than the opponent. This allows one to drive change rather than by being driven by it and is key to surviving in the emerging complex security environment of the twenty-first century.

Citing Boyd, Lind posits that one of the practical tools for driving change on the battlefield is the exercise of reconnaissance pull tactics in offensive operations.[54] This technique of identifying "gaps" or weak points in an enemy's sector to exploit while avoiding decisive engagement along the "surfaces" or strengths is at the heart of

maneuver warfare tactics.[55] This tactical technique may have operational ramifications. With true "recon pull" implementation, a higher headquarters never knows exactly the time and place of the penetration before operations commence. Actions follow only after identification of these gaps by subordinate reconnaissance. Decentralized decision-making and action to exploit the gaps allows friendly units then to drive operational tempo.

Since reconnaissance pull tactics cannot exist without decentralized action, true decentralized action can only come from full implementation of *Auftragstaktik* or *mission tactics*. Maneuver Warfare builds on this as a cornerstone for decentralized action so necessary for dominating the mind-time-space of an opponent. According to Boyd, mission tactics may be thought of as series of contracts between superior and subordinates. The superior pledges to make his desired result crystal clear and then leave his subordinate maximum latitude attaining that result. The leader also pledges to back him up when he makes mistakes so long as they are mistaken initiatives and not the result of passivity. The contract of course includes subordinate responsibilities as well. The subordinate pledges to pursue the superior's goals vigorously in order to achieve the operational aim. He will discipline himself so that his initiative serves his higher commander's intent. The subordinate must also be willing to risk making mistakes.

Unfortunately, toleration of mistakes and use of initiative is antithetical to modern Army culture--so often touted but consistently ignored. American military history is not completely void of either but the singular examples lack sufficient reinforcement in modern day training. Little in the present-day, time-compressed Army training structure fosters an environment conducive to risk taking. Every training event whether a few days

in a local training area, a simulations training, or a CTC rotation, competes jealously for time and resources often at the exclusion of toleration of mistakes and use of initiative.[56] Time is precious and mistakes waste time. NCOs and officers quickly learn that if one does only what is expected, trouble may be avoided. Doing something extra without being told often brings at best a cautionary pat on the back. Conformity is rewarded much more than initiative. As an interesting contrast, the German *Wehrmacht* tolerated mistakes derived from too much boldness while dismissing only those who proceeded from overcautious or unwilling decision-making. This American resistance to such ideas would make true implementation of *Auftragstaktik* (mission tactics), *Schwerpunkt*, and high tempo operations problematic at best.

The final component of the mission tactics "contract" is the mutual agreement to focus all efforts, "*outward* on the situation, the enemy, and what must be accomplished to defeat him, rather than *inward* on process, procedure, format, and hierarchy."[57] This completes the contract but not the connection between mission tactics and maneuver warfare. It leads one to a final critical component of maneuver warfare theory--the use of a unifying aim to guide decentralized execution in the time-competitive environment of combat.

As noted earlier, Boyd uses the German concept of *Schwerpunkt* to describe this unifying quality so necessary for mission tactics. With the specified *Schwerpunkt*, the commander ruthlessly decides what action will attain a decision. Resources are then focused with a conscious effort to acknowledge the associated risks. Too often, commanders fail to focus the distribution of resources choosing instead to act in a manner that seems fair in an attempt to cover all the bases. This fairness can lead to a complete

loss of focus and a failure to attain a decisive result. Worse yet, according to Lind, if a commander's character or military judgment is weak, he will simply be incapable of designating a *Schwerpunkt* because he is either unwilling or unable to make the necessary decisions. He adds that as the situation evolves, the *Schwerpunkt* may change and commanders at all levels through mission tactics must learn to adapt accordingly.[58]

An Opposing View

Daniel Bolger strikes hard at the maneuver warfare concept with frankness and a bit of levity. Bolger attempts to punch holes in the "facade" of maneuver warfare by measuring the theory against practical application. He begins with a roll-up assessment of modern maneuver warfare theory as he argues that maneuver warfare enthusiasts base their ideas on four faulty assumptions:

> 1) A maneuverist believes that the human activity known as war can be understood through the medium of social science. 2) ...that war is war, whether conducted at low or high intensity, at the tactical or strategic level, on land, sea, or air. 3)...there is a need to emphasize the dislocating effects of maneuver over the killing effects of firepower. 4)...military history proves this.[59]

Bolger asserts that from these assumptions flow a number of prescriptions such as the imperative of avoiding enemy strength and attacking weaknesses, encouraging subordinates to seize battlefield initiative, and winning wars at the operational level devoid of the distractions of politics and tactical friction. He concludes with a sarcastic, "Too bad that it [the entire maneuver warfare concept] has very little to do with the messy realities of war."[60] His critiques strike hard and deep as we shall see.

Wars are Wars: Bolger argues that maneuver warfare enthusiasts seem interested only in WWII reruns of a European, mid-intensity mechanized environment. He chides,

"The relevance of this fixation is questionable, as it currently accounts for only about four days out of the last 4 ½ decades of post-WWII American military experience."[61] He further insinuates that these enthusiasts led by Boyd dogmatically subscribe to the tenets of Blitzkrieg as the epitome of maneuver warfare.

By now the reader should recognize that Bolger's charges are not entirely fair. With its assessment of both conventional and guerilla warfare, the Boyd Theory accounts for a broad historical perspective. In a fair treatment of the history of warfare, Boyd rightly includes an analysis of the *Wehrmacht*. Yet Boyd focuses on the German operational philosophy rather than the tactics commonly associated with the WWII style Blitzkrieg. The discussions of the lessons learned from the *Wehrmacht* are intended as a point of departure rather than an end in of itself. Boyd actually joins Bolger in warning against dogmatic, prescriptive theories of warfare. In this sense, he encourages a philosophical reflection rather than a doctrinal following.

Avoiding Enemy Strengths: Bolger challenges the implication by maneuver enthusiasts that all competent military actions should take the indirect approach to attack an enemy strength. He asks, "How does one avoid enemy strength when forced to storm a bristling embassy complex full of hostages…Does the operational level of war comfort a flier forced to hit a certain heavily defended Scud missile launcher to appease an American ally?" Bolger adds in his critique, that terrain in addition to mission often dictates the course of action. Numerous examples exist of the inherent friction between the indirect approach and the terrain available. "The 1st Marine Division had only one way out of the Chosin Reservoir in 1950, and the Chinese knew it."[62] For each side, the terrain determined the action and neither could avoid its consequences. Bolger offers

other examples of operations that required a direct approach towards an enemy strength: Vicksburg (although he got it dead wrong here--Grant's success actually owed to his indirect approach), relief of Bastogne, Entebbe to name a few.

In a different context, Bolger charges that maneuverists offer a poor defense against his arguments. Their claim that enemy strengths are not always physical but may include "command structure, mode of warfare and combat array, or even actual technical systems,"[63] amounts to little more than a loophole. To Bolger, this overly broad perspective conveniently allows maneuver enthusiasts to designate almost any operation as an attack against an enemy strength.[64] For true maneuverists, Bolger's criticisms seem petty but the questions do raise issues about the blanket application of theory.

Boyd would likely avoid the entanglements of discussing specific target choices or objectives in support of his theory. In a related sense, even Clausewitz ventured a more prescriptive view of such ideas as centers of gravity than did Boyd. Boyd preferred to address himself to the larger aim of war—that of imposing one's will forcefully--as the focus of his ideas. Whether this is accomplished by attacking tangible or intangible centers of gravity was of little concern to Boyd. He would likely accept the notion of a varied target set and application according to METT-TC as long as the aim conformed to his ideas of getting inside the Mind-Time-Space to "out-OODA" an opponent. This broader perspective in true Clausewitzian fashion rarely satisfies the eager critic looking for the school solution for war.

Maneuver vs. Firepower. With Bolger as only the most recent critic, others continue to charge that maneuverists avoid the complimentary affects of maneuver and firepower. Here Bolger labels this as aversion to attrition warfare. The literature on this

subject, however, simply does not support his claim. Boyd would likely agree with Col. Dave Palmer, author of *Summons of the Trumpet*, that "Attrition is not a strategy, it is in fact, irrefutable proof of the absence of strategy."[65] The question lies not in the use or avoidance of fires but the aim. Maneuverists use fires to position forces deep to create shock-inducing paralysis both physically and temporally. The alternative uses maneuver to position fires with destruction rather than paralysis as the primary aim. Depending on the situation, the U.S. has used both methods of warfighting in recent operations. Boyd would encourage the judicious use of fires in keeping with the overall aim of maneuver warfare.

Misuse of History. Bolger offers different perspectives on the much-touted examples of maneuver warfare such as the German Blitzkrieg or the Arab/Israeli wars. For those who pick and choose history to suit their cause such as the German success in France in 1940, Bogler asks what about Russia the following summer or later operations like Kursk, Omaha Beach, and Operation Cobra? According to Bolger, the successes accrued to the Germans and the Israelis resulted from the low caliber of their opponents rather than the strengths of their own operational paradigms.

This debate lingers and it is beyond the scope of this paper to pronounce a definitive conclusion to the issue. It is true that history reveals that many of these classic cases of victory often occurred through happenstance rather than calculated action with the results somewhat skewed in the process. Yet the resulting observations however different from expectations, do permit reasonable inference of some valuable lessons for future synthesis into theory.

Leonard joins Bolger in finding fault with some of the maneuver warfare theory. In contrast to Bolger's claim of mission tactics as an American tradition, Leonard observes that in reality, modern practices of conformity and detailed orders risk forming new traditions averse to initiative. Leonard moves on to describe the disadvantages and advantages of the detailed versus mission tactics style of command and control.

Mission tactics or as Leonard calls it, directive control, places greater burdens on the inherently less experienced subordinates to carry the day in the heat of the battle where decisions are often clouded by the stress of the situation. Additionally, directive control violates implicitly the principle of unity of command. That *Schwerpunkt* would be the saving grace of this problem is not without its shortcomings. Leonard argues that as a compensating function to overcome the drawbacks of diffuse operations inherent in mission tactics, *Schwerpunkt* seriously risks falling short of its intended unifying affect. It assumes that the commander's intent is effectively communicated. Dr. Gary Klein's shares Leonard's concerns. His recent study of tactical units in the Marine Corps demonstrated that for a variety of reasons, subordinates in the field understood their commander's intent only 50% of the time.[66]

In contrast, a detailed plan does not need to rely as much on the unifying concept as it is implicit in the order.[67] David Fadok noted that the Soviet Operational Maneuver Group, a concept most favored by Boyd (Lind disputes this) as the best example of maneuver warfare implementation, actually discarded the idea of mission tactics. The Soviet concept favored simplifying the problem set for subordinates by maintaining a centralized, detailed mission concept. Speed was achieved through concentrated actions not free-flowing adaptable operations. Cultural characteristics such as the heterogeneity

of the Soviet Army and the desire for momentum combined to necessitate detailed command and control structures, but their example gives pause to the idea of universal application of *Auftragstaktik.*

Leonard joins the debate again with a claim that the U.S. military's increased reliance on technology is shifting the point of decision-making to the level that controls the intelligence. He insinuates that control of intelligence equates to control of information about the battlefield. Technologies that increase the ability to "see" the battlefield with real-time sensor connectivity between the levels of command will drive this change. The net effect of such direct access to information sources at the operational level will result in gradual absorption of tactical level decision-making by the operational commander. As Leonard puts it, "He who controls the intelligence controls the decision-making."[68] Implementation of mission tactics faces even more challenges as increased requirements to operate with ad-hoc coalitions, inter-agencies, and reserve forces also "connotes an even greater centralization of command."[69] Leonard questions not the integrity of the maneuver warfare tenet of mission-tactics but its practicality.

Returning to Bolger, maneuver warfare gets an unlikely boost as he concludes with some conciliatory comments. Maneuver warfare receives high marks for its emphasis on men over machines and people over technology. As Bolger puts it, "in an age of computerized command and control, maneuverists stand tall for the central importance of leader initiative. Most important of all, the maneuverists have consistently challenged the American defense establishment to look at itself."[70] Boyd's theory elaborates on many of these themes in an interesting contrast to Bolger's overwhelming condemnation of maneuver warfare.

Whether fact or fiction, the Boyd Theory has earned a place in the mainstream Army debate on the future of its operational philosophy. What remains is a final analysis to determine the extent of the influence it should have on the outcome of this debate.

SECTION 4

SYNTHESIS AND CONCLUSIONS

The literature covering the depth and breadth of the dialogue on maneuver warfare is immense. Equally intimidating is the volume of expert opinion about the nature of future conflict from the possible to the probable. The debate will not end here but we may at least postulate the proper role that the Boyd Theory should play in Army operations given current trends. In true Boyd fashion, we might say that the question of relevance posed in the thesis then is not a black and white issue but one of measure against evolving external and internal requirements. As noted earlier, many have judged Boyd's entire body of work from narrow interpretations of his simplistic donut-shaped model. Paradoxically, the model is both the reason for his theory's success on one level and the failure for adoption on another. Yet we understand now that Boyd's ideas range far beyond that of a simple construct for decision-making or command and control. By expanding his theoretical focus to the larger aims of dominating the moral-mental dimensions of conflict and competition, Boyd transforms the OODA loop from a model of human behavior into a conception for human interaction in war. As such his ideas encompass both the process of command and control and the ideas behind maneuver warfare. More importantly, Boyd offers broader conceptualizations of how to think about modern military operations. It is in this broader context that the Boyd Theory is best viewed.

Given the emerging international security environment, discerning the intersection of the Boyd Theory with current Army doctrine is more relevant than ever.[71] A final review of the more prominent issues and concerns may aid in analysis.

The Final Debate

The debate was perhaps best typified by the dialogue between William Lind and Army Col. Huba Wass de Czege in the mid 1980's. Lind, ever the Boyd proponent, and Col. Wass de Czege the frustrated maneuverist charged with writing the Army's capstone manual on operations, voiced the classic opposing views. Col. Wass de Czege argued that maneuver warfare theory was based on three primary false assumptions rendering it virtually unusable as a prescription for doctrine.

First, Boyd's ideas assume "that contemporary armies are so lacking in resiliency that they are easily susceptible to psychological disorientation and collapse."[72] Wass de Czege notes that history is replete with examples such as the Nazi invasion of Russia in WWII in which the German opponent failed to become passive or despondent in response to overwhelming odds. The second reported faulty assumption of maneuver warfare includes the reliance on,

> ...purposeful ambiguity and the creation of false images on the battlefield to disorient and collapse an enemy require that the enemy be sophisticated enough to recognize the images but not too sophisticated to see through them. To make it the sole basis of a doctrine of warfare is a risky and dangerous game. Opponents rarely perceive messages as we think they do. Finally, with this focus on rapid operation of the decision cycle, the maneuver warfare proponents neglect the impact of numbers in warfare. At some point, numbers do count.[73]

To Col. Wass de Czege, the methods of maneuver warfare designed to address these issues, although conceivable, require great skill for ground forces to execute and are especially difficult for an army so dependent on reserves.

Lind responds with a reminder that Boyd's maneuver warfare offers hope to an army that must expect to fight outnumbered. "Against physically superior forces, an attrition contest can have only one outcome," implying that the alternative however flawed is better. [74] Even Liddel Hart wrote, "a strategist should think in terms of paralyzing, not killing. Even on the lower plane of warfare, a man killed is merely one man less, whereas a man unnerved is a highly infectious carrier of fear, capable of spreading an epidemic of panic."[75] Lind would likely agree with Col. Wass de Czege that there are many historical examples of the impotent use of maneuver warfare in strategy and operations. He would argue though, that the great failure of maneuver warfare is not to be found in history but in our own inability to understand the full implications of implementation.

> ...maneuver warfare is not just a matter of rewriting some field manuals. It is a call for fundamental change in almost every aspect of the Army's life. We cannot restrict maneuver warfare to doctrine and expect it to be of more than academic significance. Having a maneuver doctrine is one thing; being able to practice maneuver warfare consistently on the battlefield is very much more.[76]

He adds that these major changes would include: 1) creating quality individual soldiers imbued with great cohesion, esprit, and high morale, 2) changing the officer education system to reward boldness and imagination by eliminating the up or out fixation as a starter, 3) improving the officer education to include more history in preparation for intuitive decision-making, 4) streamlining organizations, and 5) changing the institutional

structure of the Army from a hierarchical bureaucratic organization to one that learns, grows, reacts, and polices themselves according to socialized behavioral norms much like the Marines.[77] Only then may maneuver warfare ever hope to improve upon past mistakes.

In the end, they both agree more than they disagree. The author of *The Defense Reform Debate* noted,

> In contrasting the chapters by Lind and Wass de Czege, the reader is likely to be struck initially by the apparent similarity in the arguments of each. Both authors accept the view that the precepts of maneuver warfare represent a distinctly more intelligent approach to combat than the firepower-attrition paradigm...[78]

The difference lies in their concept of what doctrine is. Lind states that "doctrine is a way of thinking...not what to think, but how to think." Alternatively, Wass de Czege argues that "doctrine must tell soldiers today how to fight tomorrow..." This distinction is important and lies at the heart of determining the relevance of Boyd's teachings. Its is in this realm of *how* to think that Boyd makes his contribution.

Synthesis and Conclusions

In the final analysis, the Boyd Theory a major contributor to the modern maneuver warfare movement has even more to offer the Army at the turn of the century than ever before. As the Army gets smaller and learns to act faster and farther in more complex environments, Boyd's ideas offer great insights into dealing with adversity. The Boyd Theory is less a call for emasculation of current Army doctrine than a warning to resist existing inclinations. It is not whether the modern Army operational paradigm fails to provide a process for thinking through issues, it is the fact that it does that makes the Boyd Theory all the more attractive. By adhering to the process, Army leaders may fail to

recognize and respond quickly to the important subtleties inherent in the ever-shifting realities of military operations. In short, the Army should pay greater attention to the man and his comprehensive approach to warfare as articulated in the Boyd Theory.

To begin with, the Boyd Theory implicitly encourages a dynamic approach to strategic and operational thinking in the nature of *Gestalt*.[79] This contrasts with the inherently analytical nature of Army planning and decision-making. While recognizing the necessity of analysis, Boyd expounds on current operational theory to further the role of synthesis as an enabler to intuition. It is perhaps this in-depth exploration of synthesis as an element of the Orientation phase in the OODA loop that represents his most profound contribution to the body of Army operational thinking. Synthesis is the key to a broader understanding of his ideas.

Synthesis, as a tool to help make sense of emerging realities, enables one to adapt appropriately to complex and uncertain environments. According to Boyd, doing this faster than the enemy allows one to achieve the requisite advantage of getting inside an adversary's moral-mental-time cycle. Coupled with increased freedoms for subordinate decision-making, these operating approaches can combine to help friendly forces take advantage of the discontinuities of unforeseen and unfolding events. Contrary to popular critiques, the ability to out OODA an opponent while difficult to execute has application in the Army precisely *because* of the unique frictions of ground operations.

Predating Dr. Henry Mintzberg's writings in the *Rise and Fall of Strategic Planning*, Boyd also implicitly warns of the pitfalls in strategic and operational formulation. In true Clausewitzian fashion, Boyd cautions against the false notions of *predetermination* (Mintzberg's term) in operational thinking.[80] Equally important, Boyd

encourages aggressive engagement of elements in both the internal and external environments in an effort to stay outwardly focused. Boyd's insistence on the outward orientation contributes to the notion of staying properly plugged in to on-going operational realities while formulating future actions. In this sense, the Boyd Theory addresses Mintzberg's warning against *detachment* of forward-looking planners from the shifting sands of current operations.[81] Boyd encourages constant repositioning of mental models to adjust and respond more quickly to emerging strategies than an opponent. This has the added effect of creating a mind-set more predisposed to fighting the opponent rather than the plan. Boyd's understanding of pattern recognition also supports Dr. Gary Klein's encouragement of naturalistic or intuitive decision-making in time-sensitive situations. Boyd offers few practical guidelines but his logic is sound and his message is grossly underappreciated in the Army today.

Boyd's endorsement of naturalistic, intuitive thinking is important.[82] It not only saves time but also fosters flexibility and lower-level initiative. It also provides the fertile ground necessary for boldness, Clausewitz's luxuriant weed, to grow.[83] These qualities will become even more vital to an Army increasingly reliant on small unit actions in distributed, complex, nonlinear operations.

Intuitive thinking does have its limitations. Dr. Gary Klein and Col. Boyd both offer solutions for complex or nonlinear decision-making when pattern matching fails or is inappropriate. For Klein, these solutions include the use of leverage points to make sense of ambiguity as part of his recognition-primed decision-making model (RPD). Leverage points are those features of a situation that can be readily exploited. In a very real sense they resemble the destructed or dismembered parts of the whole that Boyd

introduced in his essay, *Destruction and Creation.* In Klein's graphic portrayal of his nonlinear account of problem solving, he suggests that leverage points may become useful when ambiguity pervades during the problem representation stage. At this point, when "we do not recognize what to do we must rely on leverage points in order to construct a new course of action."[84] Klein's problem representation and use of leverage points corresponds well to Boyd's emphasis on understanding the Orientation phase of the OODA.

However, in an acknowledgment of his critics, Klein agrees that RPD is not for every situation.

> I wouldn't want an analytical fireman in charge of putting out a fire in my house. And I do not want an intuitive, recognitional accountant telling me how much I owe in taxes. But having said this, we find that the great majority of situations are inappropriate for analytical strategies. I believe the Army errs in pushing analysis in too many places where it does not belong, and in failing to provide the experience base for leaders to build and apply their expertise.[85]

The emphasis should remain on developing decision-makers capable of using various styles of decision-making rather than relying on prescriptive models to guide action. Klein adds, "I don't believe you would want to teach the OODA loop [as a decision-making model] itself because expertise comes from experience, not from following the OODA loop or any other decision-making model."[86] This shift from focusing on models to an emphasis on developing deciders equipped with a variety of paradigms and models to choose from is important. It is a distinction between prescriptive modeling and encouragement of the naturalistic decision-making. Boyd would endorse Klein's view.

Not to be forgotten is Boyd's emphasis on the dimension of time in conflict interaction. This remains one of his most important insights. As the Army moves toward

a smaller and lighter force, it *should* rely on new operating paradigms to overwhelm opponents with its increased agility and massed effects rather than sheer volume of forces. This increased agility includes the ability to achieve a certain relative advantage in speed of action. The significance of this is not to be unappreciated as Sun Tzu noted 2000 years ago:

> What is of the greatest importance in war is extraordinary speed; one cannot afford to neglect opportunity...An attack may lack ingenuity, but it must be delivered with supernatural speed.[87]

In support of Sun Tzu and Boyd's thoughts on the time-competitive nature of war, Dr. Gary Klein offers his own findings on the critical role of time in operations. His research is currently leading him to new Soviet studies surfacing that reportedly suggest units that reduce decision-making times in half may consistently defeat opponents five times as large. He also notes how this finding, if verified, compliments his own research on "pilot-induced oscillation" found in human factors literature. Here, research reveals that *slow* decisions create penalties for failures to act. The incapacity to react to changing situations properly often results in overcorrecting causing unintended destructive consequences. Klein suggests that these results concur with Boyd's assumptions on time and tempo as critical factors in dominating opponents.[88]

Boyd would agree that an opponent might also use the extension of time to frustrate friendly tempo. He would argue though, that even in such cases the opponent operates with a certain necessary tempo that is vulnerable to exploitation. The Boyd Theory offers a method of gaining and maintaining a massed temporal effect to decisively advantage oneself against an opponent regardless of the time factors involved. The viability of using time to disrupt the other's OODA cycle while creating opposing non-

cooperative centers of gravity remains a constant. Out OODA-ing the enemy is more a process of achieving temporal effects than it is a process of being faster or slower. From the author's own experience in Bosnia, the idea of staying inside the opponent's OODA cycle is an important component of military and political strategy even in operations other than war. Speed may contribute less but tempo is no less important. Staying one step ahead of the opponent remains a critical factor in such environments. In fact, dictating pace in military/political circles at tactical, operational, and strategic levels is often the greatest deterrent against hostile military actions.

As the Army adapts to the information revolution, the Boyd Theory gets high marks for warning against relying on hard data for solutions to military problems in what is essentially a human endeavor. Boyd's emphasis on the human aspects of conflict and competition are often lost in the crowd of C4ISR. The Army continues to believe that technology can tame uncertainty and that the future of conflict lies more in the art of mastering the science of well-laid plans than in fighting the opponent.

In their collaborative article, *Fighting in the Fog: Dealing with Battlefield Uncertainty*, Maj John Schmitt, USMC, and Dr. Klein join Boyd in warning about the growing reliance on information technologies. Their study suggests that a new mindset is growing in the armed services that everything in the universe is made up of a finite domain of knowable datels. This school of thought believes that all information is essentially binary—either true or false. Believers argue that eliminating uncertainty is merely a matter of finding the datels and arranging them together as some jigsaw puzzle of reality.[89] Schmitt and Klein offer several reasons why these assumptions are wrong. Their perspective supports Boyd's notion of the inherently unpredictable nature of

warfare and the importance of the moral, psychological and human dimensions of conflict. Schmitt and Klein point out,

> First, information is not finite but infinite...Second, information is essentially fractal; no matter how much resolution you achieve, there is always some greater level of detail to pursue. Third, information is not intrinsically structured or contextually based. Unlike jigsaw puzzles, it can often be fitted together in any number of ways to create any variety of pictures. Fourth, information is not intrinsically binary; rather, it is fuzzy...Ground truth is hardly a simple matter...Finally, and perhaps most important, even if we could collect every bit of information we wanted, we would still not be even remotely close to gaining certainty. This is because the digital model focuses on the data level. The digital model does not address knowledge and understanding, the more important level of uncertainty.[90]

This in no way challenges Boyd's ideas on using destruction and creation to develop situational awareness.[91] On the contrary, their report reaffirms his testament on the dangers of over reliance on technology to mediate solutions in human interactions. Boyd's call for synthesis is at a level above mere information gathering for the purpose of creating knowledge and understanding.

In spite of his contributions, Boyd's thoughts on using such concepts as synthesis and implicit communication remain unfathomable to today's sound-bite generation. Each of the services finds it easier to address Boyd's complex truisms with simple models rather than lengthy discourses in their capstone and derivative manuals. This is not all bad. Admittedly, *Destruction and Creation* was not meant to be a doctrine. It lacks applicability in its raw form so necessary for effective doctrine. Unfortunately, the ideas that are used are often distorted in the doctrinal dumbing-down process.

Infusing more Boyd Theory into Army operational philosophy seems disadvantaged from the start. Maneuver Warfare, phrased as such, receives a less than

warm reception in Army circles today. In contrast, the Marines embrace the ideas openly. One may find Boyd and the OODA loop referenced in both MCDP 1, *Warfighting* and MCDP 6, *Command and Control.*

Talk of precision fires consistently receives top billing over ideas such as Dominant Maneuver in most public dialogue. Paralysis, while acknowledged as an operational function in Army doctrine, is more practically accomplished today by fires than maneuver. Proponents of the Army after Next (AAN) dutifully tout such grand concepts as Strategic Maneuver and Strategic Preclusion while pinning their hopes to a constrained set of technological innovations. With a National Command Authority renewing emphasis on fires and their effects, a cursory analysis suggests concepts such as AAN look more like a deployment methodology (not unlike the grand French plans laid in the late 1930's) than a true fighting philosophy. Consequently, maneuver concepts risk earning an attenuated role in twenty-first century warfare. Clearly, while the merits of such far-sighted concepts remain hotly debated, few can contest in what lane the operational momentum currently resides.

In the end, as the Army wrestles with finding its relevant niche among the armed services, there is great opportunity for change. The coming FM 100-5, billed partly as a transitional document to the twenty-first century, will leave the door open for new approaches to Army operational thought beyond the year 2006. Likewise, doctrines for Army Vision 2010 and Army after Next remain fertile ground for new ideas. The time has come to renew interest in the Boyd Theory and its relevant contributions to the future of Army.

Appendix A: C2 and the Boyd Theory

The 1999 draft of FM 100-34, *Command and Control* states that command and control exists as an essential element of the art and science of warfare. "No single specialized function, either by itself or in combination with any of the others, would be purposeful without command and control."[92] Yet with no shortage of attention on the subject, few experts even share a common perspective, let alone a common definition of C2. In *Principles of Command and Control*, the authors note:

> This question haunts every inquiry into the field. While the organization of the Joint Chiefs of Staff has a 'definition' of C2, it is significant that just about all C2, C3, and C3I professionals have their own definitions, and that precious few share much similarity. As it turns out, C2 is many things to many people.[93]

Recognizing this dilemma, John Boyd resolved to define C2 as it applied to his theory of maneuver warfare. The result was his 1986 slide presentation entitled, *Organic Design for Command and Control.*

Building on previous observations in both *Destruction and Creation* and *Patterns of Conflict*, Boyd describes the C2 philosophy associated with maneuver warfare theory. This unique philosophy centers on C2 as a human rather than a technological endeavor. Boyd worries that the explosion of technology in the information revolution risks overshadowing the human dimensions of C2 in favor of hardware solutions. Consequently, he argues for a command and control system that focuses on what he calls the organic aspects of C2.

He begins with a reminder that all successful maneuver operations must address the functions of variety/rapidity and harmony/initiative. These functions cannot exist without the command and control process that harnesses the potential of these competing yet complimentary concepts. The Orientation phase of the OODA cycle is the key to actualizing these ideas.

As detailed earlier, Boyd considers the Orientation as the critical phasing of the OODA process. He now adds,

> ...without orientation there is no command and control worthy of the name...Orientation shapes the way we interact with the environment—hence the way we observe, decide, and act...Orientation shapes the character of present OODA loops while these present loops shape the character of future orientation.[94]

With proper orientation, individuals and organizations may develop a common shared understanding (CSU) of operational situations. CSU once developed, guides action in ways that free subordinates to use both variety and initiative. The CSU also helps to reduce friction by harmonizing action with the shared vision. As the dissemination of common mental images or patterns increases, so does the opportunity for building bonds of trust within the organization. This increased trust can lead to using implicit rather than

explicit communication. In mature organizations, this implicit communication helps form a C2 system "whose secret lies in what is unstated or not communicated to one another..."[95] CSU and implicit communication combine as Boyd's Implicit Orientation.

> Implicit Orientation allows commanders and their subordinates to...Diminish their friction and reduce time, thereby permitting them to...Exploit variety/rapidity while maintaining harmony/initiative, thereby permitting them to...Get inside an adversary's O-O-D-A loops, thereby...Magnify an adversary's friction and stretch-out his time for a favorable mismatch in friction and time, thereby...Deny an adversary the opportunity to cope with events/efforts as they unfold.[96]

This idea of implicit orientation becomes the enabling element of Boyd's command and control philosophy.

Supporting the all-important maneuver warfare concept of mission tactics, Boyd builds his position for a decentralized C2 process that maximizes the freedom of leaders to execute distributed maneuver more rapidly than the opponent. For Boyd, the key to rapid action is a system of communication that exploits lower-level initiative while realizing higher-level intent. The secret of the system is the implicit communication. He goes on to warn, in terms reminiscent of his thoughts in *Destruction and Creation*, that this implicit orientation depends on full access to and extensive interaction with the external environment. Restricting or closing this interaction for fear of loosing control results in an inward focus and an eventual dissolution/disintegration of the organic whole.[97] In this case, the organic whole refers to the organization's ability to communicate effectively across the spectrum of capabilities and requirements.

Boyd described this as the epitome of C2 wherein lies the ability of the leaders to use the *implicit* nature of decision-making to deal with uncertainty, change, and stress. Classical C2 represents, "...a top-down mentality applied in a rigid or mechanical way

that ignores as well as stifles the implicit nature of human beings..."[98] Shared understanding of the problem allows individuals at all levels to observe and orient simultaneously within the organization. This shared understanding creates an environment that allows individuals to act independently yet harmoniously and outwardly to external factors. Without this outward orientation, individuals turn inward to get direction creating a closed system. Goedel, Heisenburg, and the Second Law of Thermodynamics remind us that this creates disorder, confusion, and chaos. On the other hand, an outward focus based on implicit orientation generates the ability to "create" from "destruction." The final portion of his briefing attempts to extend these ideas into a functional definition of command and control itself.

In the final few pages of Organic Design, Boyd suggests that the words command and control fail to portray the true intent of action behind the words. Command and control is among other things, a process of leading and monitoring. The words are stigmatized with such classical understandings of command as directing, ordering, compelling and control as regulating, restraining, or holding to a certain standard. Consequently, Boyd argues that the words command and control should be replaced with the *Leadership* and *Appreciation.* Leadership implies a greater range of respondents within the organization than Command. Appreciation rather than monitor or control connotes a greater recognition and clear perception of the worth or value of the idea as well as the ability to monitor.

For Boyd the key to the leadership/appreciation relationship is that the former, "must give direction in terms of what is to be done in a clear unambiguous way. [The latter] must provide assessment of what is being done also in a clear and unambiguous

way."[99] Command should be evident while control should be invisible and not interfere with command. This then describes Boyd's epitome of command and control.

Popular Theory and Doctrine

In the draft FM 100-34, *Command and Control*, the Army finds more agreement than disagreement with Boyd's ideas on command and control. A quick review of both doctrinal and theoretical discourses helps put Boyd's ideas into a context of modern thought.

The FM describes command as the personal function of the commander. To understand command beyond the inanimate definition, one must look to the *elements*: authority, visualization, decision-making, and leadership. Visualization consists of creating and thinking in mental images derived from three sources: 1) the commander's internalized personal principles, attributes, and experiences, 2) The unit's goals and endstates often expressed in his own and higher's mission and intent, and 3) the allocation of resources through plans and supporting branches and sequels.[100]

The above citations ring of Boyd's familiar and enduring emphasis on using mental images to create a shared understanding within the context of a unifying higher aim. The author gets it right by emphasizing this visualization process but strays briefly from Boyd's intent of staying outwardly focused on the external realities rather than on any well-intended plans.

FM 100-34 suggests that commanders choose to translate their vision of the endstate into action through decisions. These decisions are either reached through an intuitive or analytical process. Each carries with it advantages and disadvantages most often surfacing through the experience level of the commander and the time available.

Boyd would certainly agree with the renewed interest in emphasizing intuition versus analytical decision-making as a preferred method for saving time in the OODA process. Dr. Gary Klein, a renowned expert on decision-making suggests that one of the OODA Loop's greatest contributions is in fact its encouragement of intuition in decision-making.[101] He notes that the Marines like the OODA for this very reason. It encourages, "sizing up the situation and reacting in accordance to learned patterns. This allows them to generate tempo where they can rely on their abilities...[In contrast,] Official Army approach appears to encourage careful analysis and discourage improvisation."[102]

Klein's approach to decision-making rests on a fundamental supposition that crisis reaction decisions most often derive from experience or intuition so important to Boyd's concept of maneuver warfare. Klein's Recognition Primed Decision-Making model (RPD) is based on the recognition of patterns familiar to similar past experiences. This pattern recognition usually leads to the creation of a single dominant course of action through intuitive decision-making at the expense of detailed analysis in an effort to save time. This results in a solution that "satisfices" or accepts the first workable solution. Some critics charge that this methodology requires an assumption that the present and future look at least somewhat like the past. Furthermore, many believe intuition and therefore RPD may satisfy tactical level decision-making but oversimplify the challenges in strategic level decision-making. At the strategic level, analytical methods may prove more appropriate where the time allows and the situation demands choosing optimum solutions.

Control differs fundamentally from command in that it is systemic involving the whole organization while command pertains to an individual.[103] According to FM 10-34 (draft),

> Control allows the commander to direct the execution of operations to conform to his intent. Unlike command functions, which remain relatively similar among the echelons of command, control functions and their complexity increase with each higher echelon...and extends not just over subordinate units; it encompasses the entire system...[the commander] is governed by the reciprocal influence between his forces and himself. In this context, control in mission command establishes conditions for a self-regulating organization rather than one regulated externally.[104]

Boyd recognizes the natural friction inherent in the large, complex organizations. He proposed mission tactics as the solution to the problem with adherence to the German idea of *Schwerpunkt* as a necessary unifying element to distributed maneuver and decentralized command and control.

Like command, control also consists of elements and is governed by unique principles. FM 100-34 (draft) states that the elements of control include relevant information, communication, and structure. Relevant information equates to the translated data useful for producing a common understanding for the commander, his staff, and the organization at large. The communication acts as the "bridge linking information to decisions and decisions to action."[105] Structure refers to the overall system of relationships in place throughout the hierarchy of the organization. The principles of control include: 1) Allow maximum freedom of decision and action for subordinates, 2) create, maintain, and disseminate the common operational picture, 3) use common doctrinal procedures, and 4) provide flexibility and adaptability.[106]

Boyd would whole-heartedly endorse these elements and principles of control espoused in FM 100-34 (draft). His idea of implicit orientation rests on gaining a common operational picture through the use of similar shared mental images of the situation rather than time-wasting explicit systems that encumber the process. Boyd departs with FM 100-34 (draft) in his greater emphasis on the time/tempo relationship to the opponent and the compounding effects of faster decision-making to induce disorder, panic, and paralysis.

In its final chapter, FM 100-34 (draft) describes the exercise of command in its broadest terms using the cyclical functions of assessing, planning, preparing, and executing as a model. This cycle suggests that the exercising of C2 emphasizes a more execution-focused rather than planning-focused process.[107] Here, in the most significant acknowledgement yet of John Boyd's theories, the Army introduces the OODA Loop to describe the C2 process both at the individual and organizational levels. In discussions of the assessment function, the authors cite the OODA cycle as "imbedded in the operational system." They describe C2 as part of the Information System (INFOSYS) contributing to the creation of better situational awareness for the commander and the organization. Later the authors use the OODA loop to help describe the execution cycle of assessing, deciding, and directing.

Of course, neither FM 100-34 (draft) nor Boyd's theories were derived within a vacuum. Each acknowledges the contributions of experts from historical and contemporary studies on the theories of command and control and warfare in general. In 1990, Crumley and Sherman from the Army Research Institute for the Behavioral and Social Sciences studied a plethora of theoretical perspectives on C2. In a comprehensive

ten-year review of the literature on command and control, Crumley and Sherman concluded that, "The state-of-the-art in command and control modeling and theorizing is not well-developed..."[108] Sutton, in a review of the more general literature added, "Most of the articles are well worth reading, but one is soon convinced...that C2 is defined by the senior man present."[109]

Recognizing the extent of the problem, Crumley and Sherman resolved not to add to the confusion with yet another proposal. Instead, they reviewed 66 models of command and control and successfully developed model classifications to both add scientific rigor to the study of the command and control and to aid in categorizing. Of the five categories: implementational, organizational, behavioral system, systems oriented, and network, the authors described Boyd's contributions in terms of the organizational category. Under this category, they further delineated Boyd's theory into the sub-category of organizational process models for decision-making. The unique aspects of this sub-category evolved from such theorists as Olmstead, Zeitgeist, and Maillefert.[110] Each helped lead the movement toward decision-making that involved cyclical interaction with the environment.[111] Maillefert of particular note suggested, "command and control is an input/output system designed to allow the maximum integration of all necessary information to produce a meaningful and realistic context for the commander, at each echelon's nodal point..."[112] Other models followed with some variations of this type.

One theorist, Lawson, developed an organizational decision-making model with very familiar characteristics. His theory stated that a C2 system needs to: sense the environment (Observe), process information, compare present and desired states (Orient),

decide on an action (Decide), and act (Act). This theory defined an iterative processing system that continues to sense or monitor the environment for changes that create further decision requirements.[113] Lawson further stressed the hierarchical nature of his model highlighting a point key to Boyd's future conceptualization of successive "OODA Looping" at the different echelons of command. Lawson believed that supervisors had one of two choices for decision-making. One could either direct an action of their subordinates, or one could set a desired state (objective) required of a lower echelon and allow them to use their own C2 process to achieve the goal.[114] Lawson would later develop the C3I model, specifically including an intelligence process component that interacts with the environment and the C2 process. It is here where Boyd's theory intersects with other conventional theories according to Crumley and Sherman.

Orr would later integrate the ideas of Lawson's model of C3I and Boyd's combat process into his own model for command and control.[115] Orr's model consisting of sensing, processing, deciding, and acting corresponded directly with Boyd's OODA phases. His model more explicitly represented Lawson's contributions associating the iterative and integrative process of intelligence, C2, and the environment with both higher and lower echelons of decision-making.

Part of the value of Crumely and Sherman's research lies not only in the placement of Boyd's theory and its evolution within the body of standing literature but in the association of his theory to models that support decision-making designed for staffs and commanders. Most behavioral and systems oriented research usually default to studies that focus on how a single decision-maker makes decisions based on orders from higher. This, while important, tends to ignore the majority of the decision-making that is

done by a staff (organizational level) during the conduct of an operation. Crumley and Sherman proceed to criticize generally those proponents of the behavioral, systems, and information processing research as often overly attached to the technological or analytical tool. Moreover, these proponents' ideas often seem disconnected from a true understanding of the command and control process. The result is a poor "...melding of the sophisticated to the little known."[116]

Many of the ideas espoused by Boyd's command and control philosophy sound good. Who would not aspire to a system that optimizes C2 in a distributed environment; that maximizes freedom to subordinates; that seeks to make decisions faster and better in order to achieve a Mind-Time-Spacial advantage over an opponent? The answer seems obvious. The implications of this answer are less obvious. While many would subscribe to these tenets, history records that few are either willing or capable of full implementation.

ENDNOTES

[1] William S. Lind, Maneuver Warfare Handbook (Boulder and London: Westview Press, 1985), 5-6.

[2] William S. Lind, "The Case for Maneuver Warfare," in The Defense Reform Debate eds. Asa A. Clark IV/Peter W. Chiarelli/Jeffrey s. McKitrick/James W. Reed, (Baltimore: The Johns Hopkins University Press, 1984), 90.

[3] Ibid., 6-7. Lind is answering a question posed to himself: How does one consistently maneuver faster than the enemy to maintain the advantage of the OODA cycle? Here he answers in terms of general theory; things to think about: 1) Only a decentralized military can have a fast OODA loop. "If the observations must be passed up a chain of command, the orientation made and the decision taken at a high level, and the command for action is then transmitted back down the chain, the OODA loop is going to be slow." 2) Maneuver warfare means you will not only accept confusion and disorder but you will generate confusion through such maneuver tactics as recon pull. In such cases, higher headquarters can neither direct nor predict the exact path of advance but neither can the enemy. 3) All patterns, recipes and formulas are to be avoided. "If your tactics follow predictable patterns, the enemy can easily cut inside your OODA loop."

[4] Lind, Maneuver Warfare Handbook, 1.

[5] U.S. Marine Corps, Warfighting (MCDP-1) (Washington D.C.: June 20, 1997), 40, 72, 105. MCDP 1 doesn't speak of Boyd or the OODA loop within the body of the main text. It does acknowledge Boyd and Lind in the endnotes on such issues as tempo, maneuver

warfare, and recon pull. In MCDP 6 and NDP 6, Command and Control the OODA loop is explicitly depicted as the point of departure for command and control theory.

[6] U.S. Air Force, Air Force Glossary (AFDD 1-2) (Washington D.C.: Department of the Air Force, 1997), 22.

[7] David S. Fadok, LTC, "John Boyd and John Warden: Airpower's Quest for Strategic Paralysis," in The Paths of Heaven: The Evolution of Airpower Theory (Maxwell AFB: Air University Press, 1997), 357. Fadok contends that both Boyd and Warden share a fundamental common theme—the goal of defeating one's adversary by strategic paralysis. He is unable to conclude whether Warden derived specifically and directly from Boyd, but he uses each theory to make the case that the Air Force needs to combine both into a workable doctrine for the future of the Air Force.

[8] U.S. Army, Command and Control (FM 100-34) (Washington, D.C.: Draft, 1999), A-3.

[9] Mr. Bill Connor, lead writer for FM 100-34, telephone conversation, 24 August, 1999. Mr. Connor stated that after review of the literature on decision-making models, Boyd's model lacked anything substantial enough to dramatically alter current Army doctrine. He indicated that that the OODA loop seemed only a convenient way of describing some of the general principles of C2. Insinuating that he was still open new insights, Mr. Connor encouraged the author to pursue the investigation of the Boyd Theory in detail with a request to review the findings.

[10] CPT Robert L. Bateman, III, "Avoiding Information Overload," Military Review, July-August 1998, 54-55.

[11] Fadok, 361.

[12] Carl Von Clausewitz, On War, eds. Michael Howard and Peter Peret, (Princeton: Princeton University Press, 1989), 152, 141.

[13] Frank Spinney, "Genghis John," Proceedings, July 1997, 47.

[14] Ibid.

[15] Stephen A. Shambach, Strategic Leadership Workshop: Strategic Decision-Making in the Information Age, October 1-2, 1996, http://carlisle-www.army.mil/usawc/dclm/wrkshop/rptprocd.htm/ (August 19, 1999),1-23.

[16] U.S. Army Training and Doctrine Command, Annual Report on the Army After Next (AAN) Project (Fort Monroe, VA: Training and Doctrine Command, 1998), 6.

[17] Janet S. Kennelly, Archivist at the Marine Corps University Research Archives, telephone conversation, 04 Sep 1999.

[18] Frank Spinney, "Genghis John," Proceedings, July 1997, 42-43. One of John Boyd's best friends and associate, Frank Spiney offers a short biographical sketch of John Boyd. Boyd started his career as a 19-year old draftee in the Army occupying Japan during the cold winter of 1945-46. He first gained notoriety when he led a revolt against the terrible conditions his soldiers endured including damp tents and uncooked K-rations while the officers reveled in hot food and warm quarters. Amid these conditions, he chopped down a wooden hanger and burned it to keep the soldiers warm and for that was court-martialed. During the trial, he turned the tables on the officers in a referendum on leadership and responsibility and won. He left the Army and went to college on the GI Bill where he met his wife. He graduated with a degree in economics and was commissioned in the Air Force. He flew 20 combat missions in F-86's at the tail of the

Korean War and went on to be one of the first instructors at the Fighter Weapon School. Over the next several years, Boyd would teach himself enough calculus to develop his theory of energy-maneuverability. The E-M theory in spite of the critics, proved a stunning success as a universal language for translating tactics into engineering specifications and vice versa. This would lead engineers to improve and develop the design of the YF-16--still one of the most successful lightweight fighters in the world. In 1973, he obsessed in his quest of understanding how the mind creates knowledge through the studies of science, philosophy, and the humanities. This led him to write the 16-page double-spaced paper entitled *Destruction and Creation.* He didn't publish but allowed many distinguished scientists and mathematicians to try to poke holes in the theory – none could. Boyd became a force in the industry with his unabashed lifestyle. He worked the military-industrial-congressional complex with abandon and unfettered integrity and simplicity. He rankled many inside the Beltway with his unorthodox style of honesty and forthrightness leaving his enemies no leverage for corruption. When asked why he lived this way, Boyd responded, "The most important thing in life is to be free to do things. There are only two ways to insure that freedom—you can be rich or you can reduce your needs to zero. I will never be rich, so I have chosen to crank down my desires. The bureaucracy cannot take anything from me, because there is nothing to take." He died in 1997 survived by his wife and five children.

[19] U.S. Army, Operations (FM 100-5) (Washington, DC.: Department of the Army, 1993), 2-7.

[20] John Boyd, "Patterns of Conflict," in "Discourses on Winning and Losing,"(Unpublished slide show archived at the Marine Corps University Research Archives, Quantico, VA, 1986), chart 132.

[21] Naveh, Shimon, In Pursuit of Military Excellence (Portland, OR: Frank Cass Publishers, 1997), 279.

[22] Ibid., 258.

[23] John Boyd, "Destruction and Creation," (An unpublished 16-page essay archived at the Marine Corps University Research Archives, Quantico, VA, 1976), chart 1.

[24] Ibid.

[25] Ibid., 2.

[26] Ibid., 3.

[27] Ibid., 9.

[28] John Boyd, "Destruction and Creation," chart 10.

[29] Ibid. "Heisenburg in 1927 showed that one could not simultaneously fix or determine precisely the velocity and position of a particle or body. Specifically he showed, due to the presence and influence of an observer, that the product of the velocity and position uncertainties is equal to or greater than a small number (Planck's Constant) divided by the mass of the particle or body being investigated...In other words, when the intended distinction between observer and observed begins to disappear, the uncertainty values hide or mask phenomena behavior...Under these circumstances, the uncertainty values represent the inability to determine the character or nature (consistency) of a system within itself...Keeping in mind that the Heisenberg Principle implicitly depends upon the indeterminate presence and influence of an observer, we can now see...that the

magnitude of the uncertainty values represent the degree of intrusion by the observer upon the observed. When intrusion is total (that is, when the intended distinction between observer and observed essentially disappears, the uncertainty values indicate erratic behavior."

[30] Ibid., 12. "Entropy is a concept that represents the potential for doing work, the capacity for taking action, or the degree of confusion and disorder associated with any physical activity. High entropy implies a low potential for doing work...Low entropy implies just the opposite. Viewed in this context the Second Law of Thermodynamics states that all observed natural processes generate entropy. From this law it follows that entropy must increase in any closed system—or, for that matter, in any system that cannot communicate in an ordered fashion with other systems or environment external to itself."

[31] Ibid., 13.

[32] John Boyd, "Patterns," chart 2.

[33] Ibid., chart 5.

[34] Ibid., chart 71.

[35] Ibid., chart 72.

[36] Ibid., chart 78.

[37] Lind, 18.

[38] Ibid., chart 182.

[39] Ibid., chart 177.

[40] Ibid., chart 183. The bits and pieces include: 1) compressing one's own time while stretching out an adversary's time, 2) generating unequal distributions as basis to focus one's own moral-mental-physical effort for local superiority and decisive leverage, 3) diminishing one's own while magnifying the adversary's friction, and 4) operating inside the adversary's OODA loops or getting inside his mind-time-space.

[41] John Boyd, "Organic Design for Command and Control," in "Discourses on Winning and Losing," (Unpublished slide presentation archived at the Marine Corps University Research Archives, Quantico, VA, 1986), charts 16, 25.

[42] Ibid., chart 18.

[43] Ibid., chart 23.

[44] John Antal, "Thoughts About Maneuver Warfare," in Maneuver Warfare Anthology ed. Richard D. Hooker, Jr. (CA: Presidio Press, 1993), 57.

[45] John Boyd, "Patterns of Conflict," in "Discourses on Winning and Loosing,"(Unpublished slide show archived at the Marine Corps University Research Archives, Quantico, VA, 1986), chart 79.

[46] Ibid., chart 90.

[47] Ibid., chart 96.

[48] Ibid., chart 117.

[49] Ibid.

[50] Bruce I. Gudmundsson, "Maneuver Warfare: The German Tradition"in Maneuver Warfare Anthology ed. Richard D. Hooker, Jr. (CA: Presidio Press, 1993), 274.

[51] Bevin Alexander, The Future of Warfare (New York: W.W. Norton & Company, 1995), 62. Bevin Alexander adds in his analysis of the coming age of smaller wars that

the implications as described by the Cantigny Conference members include an Army that is smaller and more mobile. "American soldiers in future wars will form small battle groups of combined arms. These groups will operate independently but will coordinate with other groups. They will possess high mobility either in land or air vehicles, and will wield weapons that are deadly and accurate at long ranges against enemy weapons and peoples." Gen. Eric Shinseki, Chief of Staff of the Army, recently recommended a move in this direction for the entire Army when he ordered the creation of the two medium contingency brigades at Ft. Lewis. His vision includes a medium brigade in every division and possible elimination of all tracked vehicles in attempt to make the Army into a more modular, faster moving force both strategically and operationally than ever before. All of this supports the prevailing notion that the large wars of massed armies have been replaced with the smaller conflicts of varying intensities fraught with asymmetric threats.

[52] William S. Lind, "The Theory and Practice of Maneuver Warfare" in Maneuver Warfare Anthology ed. Richard D. Hooker, Jr. (CA: Presidio Press, 1993), 8.

[53] Paul J. Berenson, Memorandum to General Foss, 18 April 1991. Citing a conversation with John Boyd, Paul J. Berensen, Scientific Advisor to General Foss noted in a memo to General Foss that Boyd believed that the term synchronization was no longer the right word to use as one of the four tenets of Army operations. He recommended the term Harmony as implying a better description of free interplay with a proper balance of actions rather than a prescriptive lining up of actions in concert with a play or plan. The inherent nature of war demanded a more free-flowing doctrinal approach to warfare.

[54] Lind, "The Theory and Practice of Maneuver Warfare," 10. The idea behind recon pull is to use reconnaissance assets to find the gaps and surfaces of the enemy and to pull the main body towards the gaps for penetration. It implies flexibility and adaptability by higher headquarters with the acceptance that the reconnaissance units and not higher headquarters determine the point of penetration.

[55] Ibid.

[56] Robert R. Leonard, "Maneuver Warfare and the United States Army," in Maneuver Warfare Anthology ed. Richard D. Hooker, Jr. (CA: Presidio Press, 1993), 47. Leonard offers his personal accounts of this phenomenon in Desert Storm and at the NTC. "We use detailed control at every level of command. From my personal observations during the Gulf War (I served in an infantry battalion in the 3d Armored Division), I saw no freedom for small unit commanders to make any decisions regarding battlefield maneuver. Brigade, battalion, and company commanders were told where to go, when to move, when to shoot, and when to cease fire. Above all, they were warned to keep their flanks tied in with friendly units." At the NTC, Leonard observed that "the keys to success in the training scenarios are unity of command, flawless gunnery, and good navigation. Battle is inevitable and cannot be avoided through cleaver maneuvering. Therefore there is little opportunity or payoff for a small unit commander to find a gap in the enemy defenses. This phenomenon is less obvious in mixed or close terrain. When terrain or vegetation refocuses the small unit commander's ability to see, there is a natural tendency to rely on subordinates more."

[57] Lind, "The Theory and Practice of Maneuver Warfare," 12.

[58] Ibid., 14. For Lind, the concept of *Schwerpunkt* "depends on multiple thrusts to generate massive confusion for the enemy and...disguise the *Schwerpunkt*. They also generate opportunities for shifting it." This is an important contrast to criticisms that suggest *Schwerpunkt* is concerned only with a single bold, deep thrust. Lind's interpretation also suggests that *Schwerpunkt* is a dynamic process as much as a statement of time and space.

[59] Daniel P. Bolger, "Maneuver Warfare Reconsidered,"in Maneuver Warfare Anthology ed. Richard D. Hooker, Jr. (CA: Presidio Press, 1993), 21-22.

[60] Ibid., 22.

[61] Ibid., 25.

[62] Ibid., 30.

[63] Ibid., 32. The quote here is from Edward Luttwak which Bolger cites as a maneuverist.

[64] Ibid., 30.

[65] Col. Dave R. Palmer, Summons of the Trumpet (New York: Ballantine Books, 1984), 148.

[66] Klein & Associates, A Decision-Centered Study of the Regimental Command Post (Fairborn, Ohio, 1996), 30.

[67] Leonard, 46.

[68] Ibid., 49. Leonard describes in some detail how new technological capabilities such as positional location and positional reporting will combine to offer increased visibility of the battlefield, in increasing fidelity, to increasingly higher echelons near-simultaneously. This unprecedented increased ability to see the enemy will cause most decision-making to gravitate naturally to the headquarters where the intelligence feed is the greatest. He suggests that this may spell the end of mission tactics as Boyd visualized it below the operational levels. Leonard adds that the notion that higher commanders will receive, process, and disseminate intelligence then pursue mission-tactics is hogwash. The temptation to attach orders to intelligence reports will be impossible to resist.

[69] Ibid., 53. Robert Leonard deals fairly with his treatment of Boyd. While supporting Boyd's theoretical approach to warfare, Leonard also opines about the possible pitfalls in application. First, while unquestionably the superior method of fighting, he warns that maneuver warfare makes a dubious deterrent. Most enemies understand and fear numerical superiority while few can easily visualize being dislocated, disrupted, or paralyzed. Secondly, since our strategy almost invariably assumes allied participation, preemption recedes as an option simply because the addition of each ally (hence, another sovereign government) precludes rapid strategic decision-making. Leonard charges that strategic preemption, a bona-fide cornerstone of future concepts of maneuver warfare, is unlikely given the current and projected political climate. America does not go to war suddenly. This argument is accurate in today's context. If the trend continues, AAN with its notions of strategic maneuver and preclusion may never materialize. Finally, Leonard adds that the increased complexity of tomorrow's operations breeds vulnerability. Clausewitz noted even the simple friction of moving or supplying an army can undo an organization, quite apart from enemy intentions.

[70] Bolger, 37.

[71] Stephen A. Shambach, see note 46.

[72] Col. Huba Wass de Czege, "Army Doctrinal Reform," in The Defense Reform Debate, eds. Asa A. Clark IV/Peter W. Chiarelli/Jeffrey S. Mckitrick/James W. Reed, (Baltimore: The Johns Hopkins University Press, 1984), 102.
[73] Ibid. 103.
[74] Lind, 92.
[75] Basil H. Liddel Hart, Strategy (London: Faber & Faber, 1954), 212.
[76] Lind, "A Case for Maneuver Warfare," 100.
[77] Ibid., 95-97.
[78] Introduction to chapter 3, "Doctrinal Issues," author unknown, in The Defense Reform Debate eds. Asa A. Clark IV/Peter W. Chiarelli/Jeffrey S. Mckitrick/James W. Reed, (Baltimore: The Johns Hopkins University Press, 1984), 85-86.
[79] Society for Gestalt Theory and its Applications, http://www.enabling.org/ia/gestalt/gerhards/gtax1.html (January 5, 2000), 1-4. According to William Lind, Boyd subscribed to the Gestalt theory as an important contribution to the understanding of the ideas behind his theory for human behavior. As described here by authors from the Society for Gestalt Theory and its Application (GTA), one may see the connections between the Gestalt theory and the ideas described in his essay *Destruction and Creation*. "The Gestalt theory is a broadly interdisciplinary general theory that provides a framework for a wide variety of psychological phenomena, processes, and applications... Human beings are viewed as open systems in active interaction with their environment. It is especially suited for the understanding of order and structure in psychological events. Gestalt theory is not limited only to the concept of the Gestalt or the whole, or to the Gestalt principles of the organization of perception (as it is presented in many publications), but must be understood as essentially far broader and more encompassing: The primacy of the phenomenal: Recognizing and taking seriously the human world of experience as the only immediately given reality, and not simply discussing it away, is a fundamental assertion of Gestalt theory, the fruitfulness of which for psychology and psychotherapy has by no means been exhausted. It is the interaction of the individual and the situation in the sense of a dynamic field which determines experience and behavior, and not only drives (psychoanalysis, ethology) or external stimuli (behaviorism, Skinner) or static personality traits (classical personality theory). Connections among psychological contents are more readily and more permanently created on the basis of substantive concrete relationships than by sheer repetition and reinforcement. ***Thinking and problem solving*** are characterized by appropriate substantive organization, restructuring, and centering of the given ('insight') in the direction of the desired solution. In ***memory***, structures based on associative connections are elaborated and differentiated according to a tendency for optimal organization. ***Cognitions***, which an individual cannot integrate, lead to an experience of dissonance and to cognitive processes directed at reducing this dissonance. In a ***supra-individual whole*** such as a group, there is a tendency toward specific relationships in the interaction of strengths and needs. The epistemological orientation of Gestalt theory tends to be a kind of ***critical realism***. Methodologically, the attempt is to achieve a meaningful integration of experimental and phenomenological procedures..."

[80] Henry Mintzberg, The Rise and Fall of Strategic Planning (New York: The Free Press, 1994), 227-228, 339. He writes, "Planning assumes predetermination in a number of respects: the prediction of the environment through forecasting..., the unfolding of the strategy formation process on schedule, and the imposition of the resulting strategies on an acquiescent environment..." His bottom line is that discontinuities in the plan invariably arise making forecasting notoriously inaccurate. He adds that, "part of the assumption of predetermination... is the notion that while planning is done, and historical data are analyzed, the world sits patiently by.... Here we wish to show that all this too is fallacious, that the process of strategy making usually takes place precisely *because* the world does not hold still."

[81] Ibid., 256. Mintzberg notes that "Effective strategists are not people who abstract themselves from the daily detail but quite the opposite: they are the ones who immerse themselves in it, while being able to abstract the strategic messages from it." The idea here is that organizational decisions must not be made in a vacuum.

[82] Gary Klein, gary@klein-inc.com "OODA loops," 24 September, 1999. Personal email (25 September, 1999).

[83] Carl Von Clausewitz, On War ed. and trans. by Michael Howard and Peter Peret, (Princeton: Princeton University Press, 1989),190. Clausewitz comments on the necessity to encourage boldness and initiative in subordinates in spite of the obvious potential for mistakes. "Happy the army where ill-timed boldness occurs frequently; it is a luxuriant weed, but indicates the richness of the soil."

[84] Gary Klein, Source of Power : How People Make Decisions (Massachusetts: The MIT Press, 1999), 125.

[85] Gary Klein, email.

[86] Ibid.

[87] Sun Tzu, The Art of War, translated by Ralph D. Sawyer, (Oxford: Westview Press, 1994), 198.

[88] Gary Klein, email.

[89] Maj John Schmitt and Dr. Gary Klein, "Fighting in the Fog: Dealing with Battlefield Uncertainty," Marine Corps Gazette (August, 1996), 64-65.

[90] Ibid.

[91] Fadok, 391-392. Fadok notes that Boyd's dialectic process of destruction and creation is significant on another level. He cites Sharon Begley's definition of genius as that which rests in the ability to combine in novel ways elements from seemingly unrelated fields. For Fadok this correlates with the bi-hemispheric organization of the human mind as indicated by modern split-brain research. In short, Boyd is encouraging the notion of genius in leaders.

[92] U.S. Army, Command, Command and Control (FM 100-34) (Washington, D.C.: Department of the Army, draft 1999), vii.

[93] "Introduction," in Principles of Command and Control eds. Jon L. Boyes and Stephen J. Andriole (Washington, D.C: AFCEA International Press, 1987), xi.

[94] John Boyd, "Organic Design for Command and Control," in "Discourses on Winning and Losing," (Unpublished slide presentation archived at the Marine Corps University Research Archives, Quantico, VA, 1986), 16, 25.

[95] Ibid., 18.
[96] Ibid., 23
[97] Ibid., 21.
[98] Ibid., 33.
[99] Ibid., 32.
[100] FM 100-34, 2-4.
[101] Gary Klein, email. Dr. Klein's thoughts here in this paragraph are in line with many of his published ideas on decision-making in Sources of Power, but were expressed to me personally in an email. He was generously responding to a list of questions I had forwarded to Mr. Buzz Reed, President & CEO of Klein and Associates. Mr. Reed was kind enough to forward them to Dr. Klein.
[102] Ibid.
[103] FM 100-34, 3-1.
[104] Ibid., 3-2.
[105] Ibid., 3-6.
[106] Ibid., 3-7.
[107] Ibid., 6-1.
[108] U.S. Army Research Institute for the Behavioral and Social Sciences, Review of Command and Control Models and Theory (Alexandria, VA: 1987-89), vii.
[109] Ibid., viii.
[110] Ibid., 90. Olmstead and his various collaborators introduced the concept of an adaptive coping cycle to C2 research, and demonstrated that the effectiveness of a command post depended largely on the competence of the staff.
[111] Ibid., 20. "Olmstead and his coworkers transformed the adaptive coping cycle concept from organizational theory to the command and control research area. Representative models in this class do not appear, however, to be based on the adaptive coping cycle concept... It appears that a Naval War College study by Maillefert describes a command control model which includes both a decision-making process and an interaction with the environment. According to Maillefert, the decision-making process requires the use of information and communication systems. The decision process itself includes a definition of the problem, diagnoses, search for information, development of options, and the selection of a course of action; these steps are not very different from many of the other military decision making models."
[112] Ibid., 21.
[113] Ibid. Because the Lawson model could be applied to a command post or headquarters, it could be considered as an organizational or individual decision-making process. This is an attempt to resolve an identified tension between the two types of entities and decision-making models.
[114] Ibid.
[115] Ibid., 23. Orr referenced Boyd's unpublished "Patterns of Conflict" in his July 1983 thesis noting that Boyd's thoughts had appeared in discussions by other authors including Fallows (1981).
[116] Ibid., 91.

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