An Alternate Portrait of Ruin:
The Impact of John Boyd on United States Army Doctrine

A Monograph

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Abstract

An Alternate Portrait of Ruin: The Impact of John Boyd on United States Army Doctrine, by MAJ Jamie L. Holm, 43 pages.

The post-Vietnam era unleashed a wave of military thinkers both in and out of uniform to discover new methods of winning in land warfare. Simultaneously the Army released a succession of doctrines and retired Air Force Colonel John Boyd developed and disseminated his general theories of modern conflict. In the wake of criticisms of the Army's 1976 doctrine *Active Defense*, the Army published a new edition in 1982 and updated it in 1986 titled *AirLand Battle*. AirLand Battle and John Boyd's ideas have been compared favorably in the past, and previous research has attempted, and failed to determine any causality. This monograph seeks to further explore the overlap and highlight the key differences. John Boyd's theories were underpinned by his observations on successful trends of military history, theory, and doctrine, many of which the writers of AirLand Battle doctrine also used and cited. This monograph examines the core concepts of John Boyd, including his synthesized ideas of an alternate portrait of ruin named the theme of disintegration and collapse and the Observe, Orient, Decide, and Act cycle. While many of the same core concepts Boyd highlights appear prolifically in AirLand battle, those synthesis ideas do not. Directly and indirectly, John Boyd influenced AirLand battle, but AirLand battle did not adopt his conclusions on the means of successful warfighting.

Contents

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Abbreviations

ADP	Army Doctrine Publication
ALB	AirLand Battle
CARL	Combined Arms Research Library
CGSC	Command and General Staff College
CJCS	Chairman of the Joint Chiefs of Staff
CTF	Combined Task Force
FM	Field Manual
FMFM	Fleet Marine Force Manual
JF	Joint Force
JP	Joint Publication
MCDP	Marine Corps Doctrinal Publishing
SAMS	School of Advanced Military Studies
USA	United States Army
USAF	United States Air Force
USMC	United States Marine Corps

Figures

Tables

Introduction

> Now in the Army, I think it's gone much deeper…you're beginning to see that these ideas are really defusing in a really broad sense throughout the US Army, and likewise at Leavenworth.
>
> —Colonel (Retired) John Boyd, *US House Armed Forces Committee Hearing April 1991*

In the wake of the Vietnam War the United States Army went through a period of reform to grapple with its highly politicized defeat. At the strategic level, the loss in Vietnam did little to affect the global competition environment between the Soviet Union (USSR) and the United States and when the United States left Vietnam in 1973, the situation in central Europe remained unchanged. Warsaw Pact conventional forces still outnumbered North Atlantic Treaty Organization (NATO) forces and there were very few lessons from the jungles of Southeast Asia that applied to the plains of central Germany. However, there was a consensus that America's focus on Vietnam degraded the readiness of the US Army as a whole. The historian Walter Kretchik assessed that "by 1973, it was apparent to many pundits that the Vietnam War had degraded training for conventional war."[1] In response to this prevailing view, US Army leaders sought reforms up and down the levels of war: the tactical, operational, and strategic. The newly formed Training and Doctrine Command (TRADOC), led by General William DePuy, published a new capstone document, Field Manual (FM) 100-5, *Operations*, to orient the force on success in large scale combat operations (LSCO, then called High Intensity Warfare) in Europe in the aftermath of a war that degraded the force and limited its experience to small unit action in Vietnam.[2]

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[1] Walter Kretchik, *U.S. Army Doctrine: From American Revolution to the War on Terror* (Lawrence: University Press of Kansas, 2011), 193.

[2] US Department of the Army, Field Manual 100-5, *Operations* (Washington, DC: Government Publishing Office, 1982), 9-2; the 1986 version of this manual made the Army's role clearer with the phrase, "while AirLand Battle doctrine focuses primarily on mid- to high-intensity warfare…," see US Department of the Army, Field Manual 100-5, *Operations* (Washington, DC: Government Publishing Office, 1986), 6.

This capstone document, the 1976 version of Field Manual 100-5, *Operations* sought to solve the numeric inferiority of NATO Forces by relying on the defense, which Clausewitz considered "the stronger form of war."[3] The new doctrine that appeared in the 1976 manual, known as *active defense*, centered on a deliberate rearguard action with precise application of firepower to over-extended Soviet armored formations. Paradoxically, the 1973 Arab-Israeli War also influenced the doctrine writers who formulated this theory of victory. A Soviet-trained force attacked a numerically inferior Israeli Defense Force that excelled at concentrating line of site firepower at a decisive point. Contrary to the active defense DePuy advocated, rapid, decentralized offensive maneuver proved critical to the Israeli victory. Kretchik observed that the 1976 manual's active defense doctrine (colloquially known as the DePuy doctrine) "unleashed an intellectual tempest within the Army" and without.[4]

On a much smaller scale, in 1973, US Air Force (USAF) Colonel John Boyd returned from his deployment to Thailand with innovative ideas that would be significant to the eventual development of his theory of maneuver warfare. Boyd retired two years later from a position in the Pentagon. During his military career, he served as an aircraft mechanic during World War II, an F-86 fighter pilot deployed to the Korean War, and a tactics instructor at the USAF Weapons School, and he had a personal hand in the development of the F-15 and F-16.[5] Most importantly, despite writing a tactics manual for jet fighter combat (which militaries still around the world still use) Boyd's most lauded achievement in uniform was his Energy-Maneuver Theory that positively changed combat aircraft design and production in many nations.

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[3] Carl von Clausewitz, *On War*, ed. and trans. Michael Howard and Peter Paret (Princeton: Princeton University Press, 1984), 358. "We have already indicated in the general terms that defense is easier than attack. But defense has a passive purpose: *preservation;* and attack a positive one: *conquest*. The latter increases one's own capacity to wage war; the former does not. So in order to state the relationship precisely, we must say that *the defensive form of warfare is intrinsically stronger than the offensive.*" Emphasis in the original.

[4] Kretchik, *U.S. Army Doctrine*, 201.

[5] Frans Osinga, *Science, Strategy and War: The Strategic Theory of John Boyd* (Abingdon, UK: Routledge, 2007), 24-26.

Soon after the publication of the 1976 version of FM 100-5, calls came from across the Army for a new doctrine to replace DePuy's active defense concept, at the same time, John Boyd, in his first year of retirement, began studying the history of land warfare. In the two decades that followed, the US Army published three new versions of FM 100-5. During the same period, John Boyd released (but never published) a comprehensive theory of warfare that significantly influenced warfighting doctrine in the US Army, Air Force, Navy and chiefly, the US Marine Corps (USMC). Whereas the USMC's 1989 Fleet Marine Force Manual (FMFM) 1, *Warfighting* borrowed significantly from Boyd's ideas, the US Army's interest in his theories has waxed and waned. Boyd's ideas are most apparent in the Army's 1986 capstone doctrine version of FM 100-5, *Operations*.

This monograph examines this influence by careful reading of two iterations of FM 100-5 since the introduction of Boyd's ideas, the 1982 and 1986 versions. The first section examines a short biographical sketch of John Boyd. The second section addresses the major works of John Boyd, with special emphasis on core concepts and warfighting theories. The third section presents an analytical assessment of two iterations of FM 100-5, *Operations,* and a small sampling of other doctrine publications to evaluate the presence and significance of Boyd's ideas.

Boyd has been the subject of considerable examination and critique, but the US Army has never formally accepted or rejected his ideas, complicating attempts to assess his influence on US Army doctrine. Air Force Major Todd Larsen suggests that focusing on the precise degree to which Boyd was responsible for ideas adopted without attribution by TRADOC obscures the larger impact of Boyd's work, concluding that "the relationship between Boyd and the AirLand Battle Doctrine was not about plagiarism, but it was rather about a professional dialogue that helped create a conceptual shift."[6] This conceptual shift can be assessed by charting the presence

[6] Todd Larsen, "John Boyd and the AirLand Battle Doctrine" (Master's monograph, US Army School of Advanced Military Studies, 2012), 42.

and prominence of Boyd's ideas in the two AirLand Battle iterations of FM 100-5 from 1982 and 1986. In these two doctrine manuals one can find many of the same concepts that John Boyd espoused, which are timeless warfighting precepts that have been advocated for by many great theoreticians over time. However, Boyd's synthesis concepts of inducing friction, generating noncooperative centers of gravity, the OODA Loop, and simultaneous conflict in the moral, mental, and physical dimension are absent from AirLand battle.

The Canon and Concepts of John Boyd

Colonel John R. Boyd began his military career by enlisting in the US Army Air Corps in late 1944, as World War II was winding toward its conclusion. He served as an aircraft turret mechanic and deployed after the war as part of the army of occupation in Japan. After leaving active duty, Boyd went to college, and then accepted a commission as a pilot in the newly established US Air Force, deploying to Korea as an F-86 Sabre pilot in 1953. After returning to the United States, he received advanced training as a fighter pilot, and became an instructor at the Fighter Weapons School. Afterwards, he obtained a second undergraduate degree in industrial engineering from the Georgia Institute of Technology. In the early 1960s, he collaborated with US Air Force mathematician Thomas Christie to develop the highly influential energy-maneuverability (E-M) model, which enabled quantitative comparison, contrast, and analysis of different aircraft designs. This breakthrough led to Boyd's removal from a planned deployment to Vietnam to instead work on the design project of what would eventually become the F-15. His work on that project led to Boyd's assignment in the late 1960s, along with other members of the so-called "Fighter Pilot Mafia," to work on the Lightweight Fighter program that ultimately produced the F-16 and the F/A-18.[7] His E-M work was also prominent in the development of the

[7] Robert Coram, *Boyd: The Fighter Pilot Who Changed the Art of War* (New York: Little, Brown, 2002), 240.

A-10 close air support platform, and the research involved in that project would take on greater importance after his retirement in shaping his thinking about warfare.[8] From 1972 to 1973, he was posted overseas commanding a combat support unit in Thailand.[9] He returned to the United States to work in a staff position at the Pentagon and retired as a colonel in 1975.[10]

The stories of Boyd's maverick behavior throughout his career are legion. As a pilot trainee, he ignored the relatively simple glide turns required to pass initial flight training, and instead studied advanced maneuvers because he thought the official training was underdeveloped. As a fighter instructor, he jumped the chain of command to push the adoption of his book of tactics, the *Aerial Attack Study*, as the official textbook for the school (it is still one of the standard texts used throughout the world). One of the most famous stories about him claims that he "stole" computer time to develop the E-M theory. Nevertheless, the stories of his behavior—epitomized with the nicknames "The Mad Major" and "Genghis John"—are revealing in that they consistently portray a man who let nothing and no one hinder his pursuit of his chosen mission. The common thread throughout Boyd's career, from US Army Air Corps private through US Air Force colonel, is his adamant insistence on doing what he thought was right, regardless of the consequences. His biographer Grant T. Hammond notes that "the most consistent theme and nearly universal comment" from those who knew Boyd was that he was "the essence of an honorable man and incorruptible."[11]

Boyd's biographer Robert Coram writes that Boyd's retirement marked an abrupt and complete change in his life, saying that "when he walked out of the Building [the Pentagon], he walked into a world of ideas. There was almost no transition."[12] While working on the A-10

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[8] Osinga, *Science, Strategy and War*, 26.

[9] Coram, *Boyd*, 268.

[10] Ibid., 277, 312.

[11] Grant T. Hammond, *The Mind of War: John Boyd and American Security* (Washington, DC: Smithsonian Institution Press, 2001), 13.

[12] Coram, *Boyd*, 319.

project with "Fighter Mafia" defense analyst Pierre Spray, Boyd interviewed World War II German *General der Panzertruppe* Hermann Balck and other tank commanders, and this may have inspired his post-retirement immersion in military history and philosophy. He spurned offers from defense contractors and others in favor of this research, and by September 1976 he finished the essay "Destruction & Creation," a work on intellectual creation and synthesis that he had begun in 1973 in Thailand. Alongside his *Aerial Attack Study*, "Destruction & Creation" was one of the only written works Boyd would ever produce—and even this he declined to publish, merely sharing copies with friends and colleagues. His most important work as a theorist of warfare was to take the form of multimedia briefing, with Boyd himself as a key component of the presentation.[13]

Probably the most important object of Boyd's interest was human sense-making systems and the application of these systems to military operations. He combined his passion for this subject with his earlier study of German maneuver warfare in World War II to develop the idea of "fast transition," which he then refined throughout the late 1970s to produce his magnum opus, the seminal briefing *Patterns of Conflict*. Ultimately taking the shape of a five-hour-long presentation, *Patterns of Conflict* introduced into military theory the famous "Observe-Orient-Decide-Act" (OODA) cycle or "decision loop," and explored its implications for warfighting. Hugely influential in military thought, Boyd spent the rest of his life as a semi-retired lecturer, delivering *Patterns of Conflict* briefings to anyone who would listen: Defense Department senior officials, congressional staffers, senior staff at service colleges, etc. As his ideas spread, he became one of the leading lights of the Defense Reform Movement, composed of military and civilian figures who advocated in Congress and the Defense Department for major changes in American defense thinking. By way of this reform movement, Boyd came to hold a semi-official role as advisor and planning assistant to Secretary of Defense Dick Cheney in the swift and

[13] Coram, *Boyd*, 330.

highly successful "Hundred Hours' War" of Operation Desert Storm. He continued his briefings, which eventually took the form of a series called "A Discourse on Winning and Losing," until his death in 1997. In keeping with Boyd's general avoidance of putting his ideas into final form on paper, the "Discourse on Winning and Losing" would remain unpublished until March 2018.[14]

Boyd's Major Works

Some commentators consider John Boyd to be the one of the most important military thinkers of the modern era. Military historian Colin Gray wrote that he deserved "at least an honorable mention" among the most significant defense strategists of the twentieth century.[15] Yet the Boyd canon is remarkably, even astonishingly scant. His first biographer, Grant Hammond, observes that Boyd achieved the extraordinary feat of being "known mainly by word of mouth and the passing of his insights from one person to the next."[16] A man who died in the last years of the twentieth century unknowingly achieved his influence through a concept that would come to the forefront of popular consciousness early in the twenty-first century: John Boyd was essentially a military influencer, and his work was memetic rather than comprehensive. There is simply no other way to understand Boyd's influence despite having produced a corpus consisting mostly of three documents and a massive multimedia slideshow.

Capitalizing on his experience in the Korean War flying the F-86 Sabre, Boyd became an instructor at the Air Force's Weapons School at Nellis Air Force Base, where squadrons throughout the Tactical Air Command (TAC) sent their best pilots to learn air combat maneuvering and then return to their squadrons to disseminate the latest tactics in an early example of the popular "train-the-trainer" model. Frustrated with the school's method of training students, Boyd spent his free time writing a 104-page manual intended to teach pilots how to

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[14] Grant T. Hammond, "Introduction," in *Discourse on Winning and Losing*, ed. Grant T. Hammond (Maxwell Air Force Base: Air University Press, 2018), 1.

[15] Colin S. Gray, *Modern Strategy* (Oxford: Oxford University Press, 1999), 90-91.

[16] Hammond, *Mind of War*, 12.

engage and destroy enemy bombers and other fighters in the jet era. The *Aerial Attack Study* is primarily a matter of air warfare, and not directly relevant to his later theories of land warfare, but it does evince the early origins of his ideas on relational maneuver, as he discusses developing one's situational awareness in relation to one's adversary.[17] Boyd writes that "any tactician must be able to define or imagine a frame of reference, within which he must operate," because "a complete knowledge of the special relationships involved" is absolutely necessary to understand "the science of fighter-versus-fighter combat." The pilot, he insists, must "understand the geometric space relationships."[18]

While assigned as a US Air Force protocol officer at Elgin Air Force Base, Boyd once again used his free time to produce work that would dramatically alter the way the world thought about aircraft, combining his earlier fighter theories with more recent educational experience in industrial engineering. Working with Defense Department civilian mathematician Thomas Christie, Boyd formulated a theory to allow quantitative examination of aircraft performance, including the evaluation of prospective design changes. Boyd and Christie surreptitiously used advanced US Air Force computers to conduct millions of dollars' worth of modeling computations to build, test, and prove their hypothesis, resulting in the E-M theory, "a way to plot not just the basic characteristics (how far, how fast, how high) of a given airplane but also the mathematically plotted maneuverability of it at different altitudes, g-forces, turning radii, and so on."[19] The award-winning theory—a mathematical construct, not a thesis or treatise—provided

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[17] Shimon Naveh, *In Pursuit of Military Excellence: The Evolution of Operational Theory* (Portland, OR: Frank Cass, 1997), 258. The term 'relational maneuver' was introduced by Edward Luttwak as "In the case of relational-maneuver the goal of incapacitating enemy forces or structures-and indeed the whole enemy entity-is pursued in a radically different way. Instead of cumulative destruction, the desired process is systemic disruption-where the "system" may be the whole array of armed forces, some fraction thereof, or indeed technical systems pure and simple." Edward N. Luttwak, "The Operational Level of War," *International Security 5*, no. 3 (Winter, 1980-1981): 64.

[18] John Boyd, *Aerial Attack Study, Report 50-10-6C* (Washington, DC: US Department of the Air Force, 1964), 49, accessed January 5, 2021, http://oplaunch.com/resources/aerial-attack-study-1964.pdf.

[19] Hammond, *Mind of War*, 57.

empirical evidence unambiguously telling TAC and Air Staff leadership and the Presidential Scientific Advisory Board that the Air Force was building an inferior air force.[20] Once presented to the Air Force, E-M modeling methodology was accepted and led to the development of the F-15 and F-16.[21]

The E-M theory illustrates similar themes to those seen in the *Aerial Attack Study* and Boyd's later work, like the ability to maneuver (freedom of action) and the need to seek relative advantage. Boyd was not content with developing a model to describe a design in a conceptual vacuum; he compared the Air Force's performance characteristics to those of their adversaries in the Soviet Union. The E-M slides that captured US Air Force leaders' attention and inspired their swift response depicted the in-flight capabilities of American fighter aircraft in direct and unflattering comparison to Soviet models.[22]

While deployed to Thailand in 1972, Boyd began work on an essay to explain the nature of creativity in light of his recent work with E-M theory.[23] This evolved into his most intellectually ambitious work, "Destruction & Creation," which he finished in 1976, after retirement from active duty. This highly abstract work, which biographer Hammond calls "more a conversation with himself than it is an essay for others," is an epistemological study of knowledge itself, a dialectic exploration of tearing concepts apart into extremes and reassembling them, combining both analysis and synthesis.[24] Boyd again revisits the *Aerial Attack Study*'s emphasis on understanding the relationships of one's perspective *vis-à-vis* the enemy's and the

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[20] Hammond, *Mind of War*, 64.

[21] Hammond "Introduction," 2.

[22] Hammond argued, "As analysis slowly penetrated the system, people began to see the full implications. The Air Force had purchased planes with poor maneuverability. Ultimately, Boyd's data suggested that we had and were continuing to build an inferior air force." Hammond, *Mind of War*, 64; Osinga, *Science, Strategy and War*, 23.

[23] Coram, *Boyd*, 323.

[24] Hammond, *Mind of War*, 120; Osinga, *Science, Strategy and War*, 131.

potential to exploit the limits of perspective, but now brings to bear Gödel's incompleteness theorem, Heisenberg's uncertainty principle, and the second law of thermodynamics. Boyd grapples with the limitations of matching concepts with observed reality and concludes (as Hammond summarizes it) that "any inward-oriented and continued effort to improve the match-up of a concept with the observed reality will only increase the degree of mismatch."[25] Boyd's foray into epistemology provided him fresh scientific reasoning to help him refine ideas he had been nurturing since 1960 and represents both his last written work and his last finished work.

The two main achievements of Boyd's military career, the *Aerial Attack Study* and the E-M theory, were obviously centered on aerial combat, and his initial impulse after retirement had been to develop a new theory for air-to-air warfare. But the work Boyd had done with Pierre Spray in the development of the A-10 Thunderbolt II, a close air support platform designed for joint service with US Army combat elements, led him instead to study close air support in World War II by interviewing several German general officers, piquing a new and voracious interest in land warfare. Boyd started "studying backwards," proceeding from Wehrmacht tactics to the interwar period and World War I, then to Clausewitz and Napoleon, to Frederick the Great, and to Sun Tzu. He was particularly interested in the campaigns of Genghis Khan and the writings of Karl Marx.[26] Having finished writing "Destruction & Creation," Boyd decided he would create a comprehensive treatment of the nature of physical conflict, something different from the readily available studies of advances in war technology. Boyd's purpose was, in his words, to "make manifest the nature of moral-mental-physical conflict. To discern a Pattern for Successful Operations. To help generalize tactics and strategy. To find a basis for Grand Strategy, to unveil the character of conflict, survival and conquest."[27]

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[25] Hammond, *Mind of War*, 120.

[26] Ibid., 121.

[27] John Boyd, "Patterns of Conflict," in *Discourse on Winning and Losing*, ed. Grant T. Hammond (Maxwell Air Force Base: Air University Press, 2018), 19.

With *Patterns of Conflict*, Boyd introduced to military theory the idea with which he would come to be most strongly associated, the Observe-Orient-Decide-Act (OODA) cycle, the weaponization of Boyd's epistemological and situational perspective ideas. Boyd's concept was inspired by relational maneuver or "fast transients," something he had been wrestling with since he had been a fighter pilot. At base, Boyd's fast transients are rapid changes in orientation or situation, "changing quickly from one direction, maneuver, speed, or altitude to another," maturing into Boyd's idea that "to win, one should operate at a faster tempo or rhythm than one's adversary."[28]

Boyd completed the first iteration of *Patterns of Conflict* in 1977, taking the form of a 193-slide briefing that took three hours to deliver. Unlike his previous work, *Patterns of Conflict* was a perpetual work in progress, changing over time in reflection of Boyd's longstanding emphasis on perception and adaptation, and on the critical importance of understanding one's environment. He would continue to update, refine, and expand the briefing for the rest of his life, such that its final iteration twenty years after he first began presenting it was an 18-hour long lecture delivered over the course of two days. Boyd delivered *Patterns of Conflict* briefings to anyone who would listen, including faculty of the Army War College, the Secretary of Defense, the small staff of a state legislator, and—in the connection with the most thorough and longest-lasting impact—the Commandant of the Marine Corps. *Patterns of Conflict* has been cited as critical to the Marine Corps' 1989 revision of its warfighting doctrine, which remains relatively unchanged to the present day.[29]

Unlike the *Aerial Attack Study* and "Destruction & Creation," *Patterns of Conflict* is not a finished product confined to a single medium in definitive form. Neither the complete slide deck nor a transcript of a Boyd's briefing fully reproduces the authentic experience, which Boyd

[28] Hammond, *Mind of War*, 123.

[29] Ian T. Brown, *A New Concept of War* (Quantico, VA: Marine Corps University Press, 2018), xxviii

constantly revised over the course of hundreds of presentations, illustrating his views on the importance of situation and perspective. Not only was he a perfectionist, but he also understood the brief as an ongoing dialogue between himself and his audiences. As a result, neither the continued presentation of the briefing by Boyd's colleagues after his death nor the Boyd papers at the Marine Corps archives, nor even complete videos of presentations by Boyd himself that have now become widely available can be understood as more than a particular version of the ever-evolving Patterns of Conflict briefing.[30]

After Boyd developed *Patterns of Conflict*, he created three supplemental presentations less overly informed by military history. These three presentations, *Strategic Game of ? and ?*, *Organic Design for Command and Control*, and *Conceptual Spiral*, combine to form Boyd's last work, *A Discourse on Winning and Losing*.[31] *Organic Design for Command and Control* is the most directly military-related of the three supplemental presentations, advocating for decentralized decision-making in military contexts, relying on command and feedback, as compared with doctrinal command and control. The *Strategic Game of ? and ?* serves as a science- and Eastern philosophy-informed link between the distinctly military realm of his other work and the more generalized philosophical ideas of competitive relative advantage with the goal of developing a strategy, which he defines as "a mental tapestry of changing intentions for harmonizing and focusing our efforts as a basis for realizing some aim or purpose in an unfolding and often unforeseen world of so many bewildering events and many contending interests," with the aim of improving "our ability to shape and adapt to unfolding circumstances, so that we (as individuals or as groups or as a culture or as a nation-state) can survive on our own terms."[32] Again one sees the importance Boyd places on perception and spatial relationships, and the echo

[30] Hammond, "Introduction," 11.

[31] Ibid., 2.

[32] John Boyd, "Strategic Game of ? and ?," in *Discourse on Winning and Losing*, ed. Grant T. Hammond (Maxwell Air Force Base: Air University Press, 2018), 313.

of fast transients as key to one's responses. Consistent with the rest of his work, "the central theme is one of interaction/isolation while the key ideas are the moral-mental-physical means towards realizing this interaction/isolation."[33]

The last of the supplemental presentations, *Conceptual Spiral*, is the least military-oriented briefing, returning to the concepts of invention, analysis, and synthesis that Boyd had explored in "Destruction & Creation." His goal was to "make evident how science, engineering, and technology influence our ability to interact and cope with an unfolding reality that we are part of, live in and feed upon."[34] He seeks to understand surprise, or "novelty" as Boyd terms it, and how one adapts to a new environment, a clear connection to Boyd's wider theme of understanding and adjusting. Boyd presents an abstract idea on the same spectrum as his fighter pilot's fast transients: "Over and over, this continuing whirl of reorientation, mismatches, analyses/synthesis enables us to comprehend, cope with, and shape as well as be shaped by the novelty that literally flows around and over us."[35]

Core Concepts

The most famous and probably most innovative—and certainly most memetic—of Boyd's ideas is the Observe-Orient-Decide-Act (OODA) cycle, the culmination of Boyd's interest in the nature of knowledge and the manner in which actors understand and adapt to changes in their environment. Simply put, the OODA cycle describes the way that a person processes new information—one observes a new fact, orients it within one's existing understanding of the situation, decides how to proceed, and then acts on the decision—and postulates that disruption of this cycle degrades the whole process, preventing an adversary not only from acting on new decisions but even from being able to make new decisions or to fully

[33] Boyd, "Strategic Game of ? and ?," 320.

[34] John Boyd, "Conceptual Spiral" in *Discourse on Winning and Losing*, ed. Grant T. Hammond (Maxwell Air Force Base: Air University Press, 2018), 335.

[35] Ibid., 335.

understand what is happening at all. Boyd argued that a sufficiently aggressive interruption of the OODA cycle creates devastating demoralization and paralysis in the adversary: "penetrate [an] adversary's moral-mental-physical being to dissolve his moral fiber, disorient his mental images, disrupt his operations, and overload his system... in order to destroy internal harmony, produce paralysis, and collapse [an] adversary's will to resist."[36]

Boyd's work on the OODA cycle drew on concepts Boyd had been developing throughout his active-duty career and into his post-retirement self-reconstruction as battle philosopher. As early as his assignment as an instructor in fighter tactics, Boyd's work with relational maneuvers or fast transients showed his intuitive belief in the need for understanding the battle space and the pilots' interrelated places within it. His E-M work, seemingly unrelated, nevertheless permitted the direct and empirical comparison of two different air combat platforms' abilities to maneuver within a given space. His epistemological study in "Destruction & Creation" created a more sophisticated framework with which to understand the way that humans analyze and synthesize information. His extensive survey of land warfare brought him to grapple with the 19th century theorist Carl von Clausewitz—Boyd mentions the man often in *Patterns of Conflict*—and his famous "fog of war." With the OODA cycle, Boyd used these concepts to describe an intellectually elegant "alternate portrait of ruin," where superior maneuverability and understanding combine to break the decision-making capacity and "render [an] adversary powerless by denying him the opportunity to cope with unfolding circumstances."[37] *Patterns of Conflict* uses two major concepts—friction and variety/rapidity—that are profoundly important to Boyd's conception of warfare.

[36] Boyd, *Patterns of Conflict*, 161.

[37] Ibid., 164.

Friction

Friction is the most important of these concepts. In a presentation at the Marine Corps Command and Staff College, Boyd mentioned it 31 times (the term appears 51 times in the printed slide decks for *A Discourse on Winning and Losing*).[38] His understanding of friction was closely related to the meaning Clausewitz ascribed to it in his seminal work *On War* as "the force that makes the apparently easy so difficult," the combination of unforeseen events and "factors that distinguish real war from war on paper."[39] Boyd mentioned Clausewitz himself 46 times, and he emphasized the Prussian's proposition that friction disrupts plans and the ability to conduct operations, but an experienced commander can use harmony and initiative to compensate for this inevitable disruption. As Clausewitz put it, "The good general must know friction in order to overcome it whenever possible, and in order not to expect a standard of achievement in his operations which this friction makes impossible."[40] With his characteristic aggressiveness, however, Boyd takes friction farther than Clausewitz, and examined it as a potential means of attack.

Boyd recognized that friction is universal, and therefore that it affects the adversary as well. He therefore posited that a commander can not only *reduce* his own friction, but he can also deliberately *increase* his adversary's friction, degrading his OODA cycle and disrupting his plans and operations: "If you diminish your friction, you diminish your time for doing things, see what I'm saying? They go together. So the more I can put friction in the other guy's system, the longer it is going to take to get his act together to do something, you're going to give him more and more delays, whether it be mental, whether it be moral, whether it be physical, or combinations

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[38] John Boyd, "Patterns of Conflict Transcript," lecture presented at United States Marine Corps Command and Staff College, Quantico, VA, 25 April and 2–3 May 1989.

[39] Carl von Clausewitz, *On War*, 119, 121.

[40] Ibid., 120.

thereof."[41] He believed that Clausewitz had not recognized the possibility of intentional friction, saying that "he failed to address if you want to try to magnify adversary's friction and uncertainty."[42] Notably, this weaponization of friction is consistent with Boyd's lifelong insistence on understanding one's own situation in the context of the adversary's, and vice versa. Neither the commander's friction nor the adversary's exists in a vacuum.

One can see a second dimension of Boyd's understanding of friction in his criticism of Clausewitz. Boyd believed, like Clausewitz, that a commander can mitigate his own friction, but he warned that doing so may create discernible—and therefore exploitable—patterns within one's own operations. Boyd believed that Clausewitz neglected this: "If you have routine in your own services and become predictable, you've also lowered your adversary's friction relative to you. You've got to think of it both ways."[43] Clausewitz's "good general" might inadvertently increase his own vulnerability to disruption if he was too predictable in his approach to dealing with friction within his own operations. This second aspect of friction once again demands that the commander understand himself with respect to the adversary.

Boyd's understanding of friction was key to his "alternate picture of ruin." Boyd argued that commanders should isolate the adversary's centers of gravity and deliberately increase friction to induce collapse in the adversary's systems ("collapse" is a word Boyd repeatedly uses when discussing the consequences of an overwhelmed OODA cycle). He described maneuver-style conflict as continual interruption and disruption of the enemy: "Generate many non-cooperative centers of gravity, as well as disorient and disrupt those that the adversary depends upon, in order to magnify friction, shatter cohesion, produce paralysis, and bring about his

[41] John Boyd, "Patterns of Conflict Transcript," 174.

[42] Ibid., 42.

[43] Boyd, "Patterns of Conflict Transcript," 142.

collapse."[44] More succinctly, he writes that "we magnify friction, produce paralysis, and get system collapse."[45]

Variety/Rapidity

Variety/rapidity is a combination of two concepts Boyd frequently paired. He mentioned variety 28 times (20 times in the slides) and rapidity 19 times in *Patterns of Conflict*, and variety 39 times and rapidity 51 times in *A Discourse on Winning and Losing*. He connected nearly all his mentions of rapidity in *Patterns of Conflict* to variety. Biographer Grant Hammond summarized Boyd's understanding of variety as "denying pattern recognition and predictability to an adversary, adopting multiple, simultaneous actions to confuse and confound an opponent, and being able transition from one initiative to another sequentially or concurrently," and rapidity as "the ability not only to act quickly but also to act to modulate the tempo of action, to know when to speed up or slow down."[46] Once again, his earliest work on air combat and E-M theory found new expression in his broader treatment of warfare. Variety/rapidity entail the changing of one's position, disposition, and velocity with respect to the adversary.

Variety can be a direct assault on the first and second stages of the adversary's OODA cycle. Boyd's commander must "employ a variety of measures that interweave menace-uncertainty-mistrust with tangles of ambiguity-deception-novelty as basis to sever [an] adversary's moral ties and disorient or twist his mental images, hence mask-distort-magnify our presence and activities."[47] Furthermore, variety comes from experience, training, and exercise, providing the commander a wide repertoire of options to choose from when dealing with different circumstances. In effect, variety offers a means of both increasing the adversary's and reducing

[44] Boyd, *Patterns of Conflict*, 142.

[45] John Boyd, "Organic Design for Command and Control," in *Discourse on Winning and Losing*, ed. Grant T. Hammond (Maxwell Air Force Base: Air University Press, 2018), 238.

[46] Hammond, "Introduction," 16.

[47] Boyd, *Patterns of Conflict*, 155.

the commander's friction. Combined with rapidity, variety allows a commander to avoid friction-predictability and inflict friction-disorganization on an adversary still attempting to deal with the commander's previous actions: "You want to throw different things at them, as many as you can, so they're developing a rep—I mean a *fingerspitzengefühl* across a wide spectrum. Really, I can't overemphasize that. This is crucial, because this is what makes you adaptable and unpredictable."[48] The adaptability and unpredictability of a commander operating with variety/rapidity creates ambiguity in the adversary's understanding of his environment, allowing the commander to disrupt the adversary's OODA cycle and paralyze his decision-making.

Harmony

Grant Hammond summarized Boyd's view on *harmony* as "the ability to blend one's actions to fit time and circumstance, to co-evolve with the strategic landscape and the tactical realities. It is achieving the 'fit' of what Boyd called the mind/time/space arena where thought and action converge appropriately."[49] Boyd drew his understanding of harmony from his readings of Sun Tzu and used the term to describe three phenomena: the relationship between a government and its people; the relational condition of supporting OODA loops; and the relationship between nodes in a warfighting center of gravity or system. Boyd defined harmony as the "power to perceive or create interaction of apparently disconnected events or entities in a connected way," and intended this definition to apply specifically to the need for an overarching vision as a basis for grand strategy.[50] Nevertheless, one can readily apply his definition outside that context.

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[48] Boyd, "Patterns of Conflict Transcript," 56. *Fingerspitzengefühl* is German for "fingertip-feeling," suggesting an intuitive familiarity with a subject derived from experience or talent, i.e., knowledge that is always at one's fingertips. Boyd adopted the phrase from German generals in World War II, especially Heinz Guderian and Hermann Balck.

[49] Hammond, "Introduction," 16.

[50] Boyd, *Patterns of Conflict*, 173

Operationally, Boyd characterized harmony as the effectiveness of units' conduct of their own OODA cycles at various echelons toward the commander's intent. In discussing the German Army's success with blitzkrieg, Boyd assessed initiative as the key to echelons working in concert, conducting independent operations at the speed of their own OODA cycle. He wrote that larger formations must observe more, which inherently makes their OODA cycle slower, while smaller formations will cycle faster: "How, in a sense, can you get the slower rhythm of the larger pattern operating with a faster rhythm with the lower pattern? Each one sort of has a certain rhythm or pace they're operating at. They're different, but how can we harmonize them?"[51] He answered his own question with a "common scheme," as he described a commander's intent and initiative, a concept covered in greater detail below. When describing harmony operationally, Boyd intrinsically linked harmony to initiative, in the same manner examined earlier with rapidity and variety.

Initiative

Boyd mentioned *initiative* forty-nine times in *Discourse on Winning and Losing*, arguing that initiative allowed subordinates to act independently, but always with an eye toward fulfilling their commander's intent. In his lecture, Boyd defined initiative as "the ability to think and take action without being urged."[52] He supplemented this definition in the slides for *Patterns of Conflict* with several additional meanings, such as an offset or counterweight to negative factors in moral conflict, or as an ingredient needed to pursue a strategic vision for vitality and growth.[53] Grant T. Hammond, however, believed that the whole body of Boyd's work yielded a broader meaning for initiative: "the willingness to lead, to take action, to identify and act upon the mismatches, and do so at the right time."[54] Notably, any of these meanings of initiative can be

[51] Boyd, "Patterns of Conflict Transcript," 92.

[52] Ibid., 19.

[53] Boyd, *Patterns of Conflict*, 145.

[54] Hammond, "Introduction," 9.

applied at any echelon and while acting in virtually any capacity. Senior commanders can apply initiative at the level of grand strategy, just as field grade officers can apply initiative at the level of small-unit tactics, whether acting or reacting.

Boyd understood initiative and harmony to have practical consequences for a commander's conduct of battle. Initiative/harmony allow a commander to "diminish [one's] own friction hence compress [one's] own time and exploit variety/rapidity in a directed way."[55] When combined with variety/rapidity, initiative/harmony "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 [the] adversary back inside himself so that he cannot cope with events/efforts as they unfold."[56] He believed that variety/rapidity can magnify the friction a commander inflicts on the adversary, but that it can also "lead to confusion, disorder and ultimately chaos" in the commander's own side if not harnessed to initiative/harmony.[57] Lastly—contrary to conventional wisdom—Boyd posited that a commander can maintain the initiative in defense or even in retrograde movement if the adversary is reacting: "See, we're taught [that] if we're going backwards, we've lost initiative. That's not true. As long as you got him playing your game rather than playing his game, you have initiative. And I don't care which direction you're going in."[58]

Ambiguity/Deception

Ambiguity and *deception* are two important concepts that Boyd considered to be distinct but very closely related. In his *Patterns* lecture, Boyd mentioned ambiguity 26 times and deception 40 times. In the *Discourse*, he mentioned them 28 times and 22 times, respectively. He

[55] Boyd, *Patterns of Conflict*, 199.

[56] Ibid., 199.

[57] John Boyd, "Organic Design for Command and Control," in *Discourse on Winning and Losing*, ed. Grant T. Hammond (Maxwell Air Force Base: Air University Press, 2018), 226.

[58] Boyd, "Patterns of Conflict Transcript," 82.

thought of ambiguity as a lack of certainty about plans or approaches, the degree of freedom of actions or potential actions for friendly forces. It is generated naturally as an adversary reacts to new information, creating confusion and delay, so that the adversary has "all kinds of impressions in his mind […] mental friction or mental entropy."[59] Deception was more complex; it was "an impression of events as they are not," a "neat picture, only it's a wrong picture of what's going on."[60] Because deception was more complex, it was more difficult to create than ambiguity: "you can generate confusion and disorder more rapidly than you generate an order, even though it's a false order. It takes longer to generate a deception over ambiguity."[61]

Boyd often paired ambiguity and deception. He particularly noted the way that Napoleon exploited ambiguity and employed deception in his early campaigns to facilitate strategic mobility.[62] In operations, ambiguity and deception create mental and moral friction in an enemy system and can be exploited to create surprise and shock.

Surprise/Shock

Surprise and *shock* comprise another dyad in Boyd's thinking. He mentioned surprise 50 times in the *Patterns of Conflict* briefing transcript, and shock 19 times. He described surprise as "disorientation generated by perceiving extreme change (of events or efforts) over a short period of time," and shock as a "paralyzing state of disorientation generated by extreme or violent change (of events or efforts) over a short period of time."[63] In his lecture, Boyd characterized them as essentially the same effect, an output resulting from a commander's action on the

[59] Boyd, "Patterns of Conflict Transcript," 32.

[60] Ibid., 132.

[61] Ibid.

[62] Boyd, *Patterns of Conflict*, 55.

[63] Ibid., 135. Emphasis in the original.

enemy's perception. The difference between surprise and shock was a matter of degree: "Surprise, if it's a softer form, or a harder form, we call it shock."[64]

Non-Cooperative Centers of Gravity

While centers of gravity are an important concept in military strategy generally, Boyd developed a more particular concept, *non-cooperative centers of gravity*, which he mentioned 27 times in lecture transcript and 10 times in the *Discourse on Winning and Losing*. This concept expresses Boyd's dissent from Clausewitz's conventional definition of centers of gravity. For the nineteenth-century Prussian general, a center of gravity "is always found where the mass is concentrated most densely."[65] Boyd was willing to borrow Clausewitz's terminology but, with his eye always on spatial relationships, rejected his definition out of hand: "That's not always true. In a donut, the center of gravity, well, there is no mass. In a hollow steel ball, it's where the steel isn't. In a dumbbell, it's in the connection between the mass."[66] Furthermore, he objected to narrowly identifying a center of gravity as the enemy's armed forces, or capital, or public opinion; Boyd disputed that there was only one center of gravity at all, seeing instead centers of gravity as part of an organic whole. The enemy's armed forces were a complex system of multiple centers of gravity, and in that complexity, Boyd saw an opportunity to exploit. If the enemy system had multiple centers of gravity, it was therefore possible to induce friction in this system and turn them against each other to generate non-cooperative centers of gravity, creating dysfunction by "striking at those tendons, connections that permit […a] larger center of gravity [to] exist." Identifying the enemy's centers of gravity and how they interrelate makes possible the deliberate disruption of those relationships, so that "the guy can't function as an organic whole."[67]

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[64] Boyd, "Patterns of Conflict Transcript," 21.

[65] Clausewitz, *On War*, 485.

[66] Boyd, "Patterns of Conflict Transcript," 21.

[67] Ibid., 42-43.

At a more abstract level, Boyd argued that non-cooperative centers of gravity were crucial to the overall concept of maneuver warfare. Mental-moral-physical non-cooperative centers of gravity would destroy the enemy's ability to function. The simultaneous generation of new non-cooperative centers of gravity and the disorientation or disruption of the centers of gravity essential to the enemy's conduct of operations would "magnify friction, shatter cohesion, produce paralysis, and bring about his collapse."[68] Tampering with centers of gravity would deprive the enemy of balance, and cause him to fall.

Moral-Mental-Physical

Boyd used the *moral-mental-physical* triad as a central theme of his understanding of conflict. He mentioned it 26 times in the *Discourse* and 61 times in the lecture transcript. It appears in the first bullet of his *Patterns of Conflict* mission statement, in which he announced that the goal of his briefing was "To make manifest the nature of Moral-Mental-Physical Conflict."[69] The last lecture slide, "central theme," exhorts the commander to "Penetrate [the] adversary's moral-mental-physical being in order to isolate him from his allies, pull him apart, and collapse his will to resist."[70] He portrayed all conflict as a struggle against an adversary as an organic whole, a complex system of interrelated centers of gravity. Furthermore, he insisted that this was true at every level of conflict, whether strategic, operational, or tactical. Commanders can and must "Generate unequal distributions as basis to focus moral-mental-physical effort for local superiority and decisive leverage."[71]

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[68] Boyd, *Patterns of Conflict*, 135.

[69] Boyd, *Patterns of Conflict*, 19. Emphasis in the original.

[70] Ibid., 207.

[71] Boyd, "Patterns of Conflict Transcript," 60. Boyd referred to "strategy and grand tactics, which are the operational level." He used the terms interchangeably but did not routinely refer to the operational level of warfare as such.

Attrition Conflict - Physical Dimension

Attrition conflict belonged purely in the physical dimension according to Boyd, and it relied first on destructive force ("firepower is king… everything else is subordinate") then on protection and mobility; but mobility only in the sense of moving away from the enemy's destructive force or brining forward supplies.[72] Boyd assessed the goal of attrition warfare in line with Clausewitz: breaking the enemy's will by seizing and holding terrain. One therefore measured the effect of attrition in enemy causalities and targets destroyed.[73] See Figure 1 for elaboration on destructive force, protection, and mobility. It would not be unfair to state that Boyd regarded attrition conflict as unimaginative and viewed those who solely practiced it as worthy of derision. Its example stands as a strawman, which Boyd used to portray maneuver and moral conflict as superior forms of warfare. Boyd cited military operations designed to take terrain objectives, which were abandoned the following day, or quantitative results such as the Defense Department publishing of daily enemy KIA as "body counts" during the Vietnam war.[74]

[72] Boyd, "Patterns of Conflict Transcript," 131; John Boyd, "Patterns of Conflict Pt. 11," n.d., video of lecture uploaded by Don Grazier, digitized from VHS tape, 18:54 to 20:14, accessed March 15, 2021, https://youtu.be/vd5Cx OjiOMQ.

[73] Boyd, *Patterns of Conflict*, 133.

[74] Boyd, "Patterns of Conflict Pt. 11," 20:04 to 20:27.

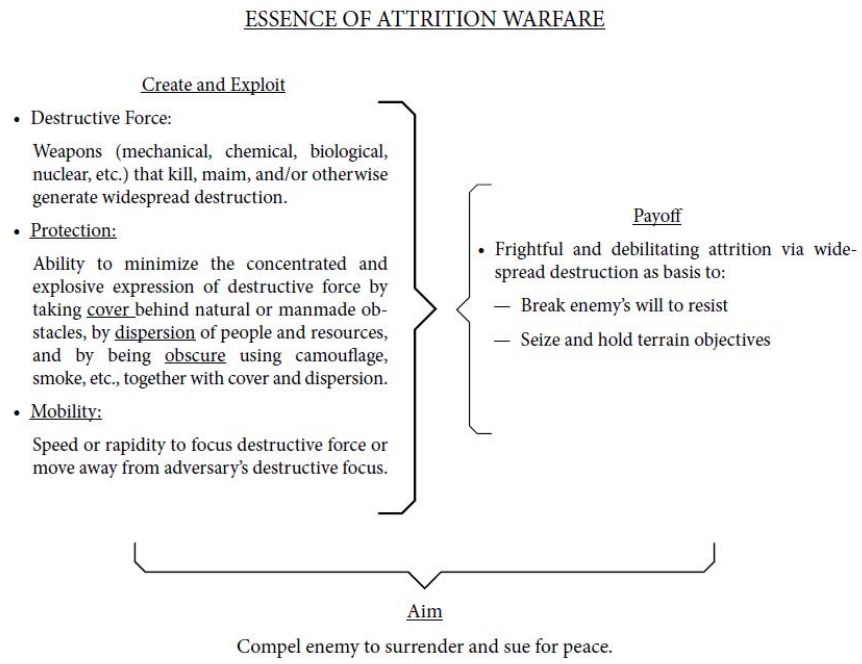

Figure 1. Essence of Attrition Warfare. John Boyd, "Patterns of Conflict" in *Discourse on Winning and Losing*, ed. by Grant T. Hammond (Maxwell Air Force Base: Air University Press, 2018), 133.

Maneuver Conflict – Mental Dimension

Boyd stated that in maneuver conflict, "Ambiguity, deception, novelty, mobility, and violence (or threat thereof) are used to generate surprise," and, compared to the quantitative metrics of terrain and enemy causalities of attrition warfare, in maneuver conflict "Indications of success tend to be qualitative and are related to the widespread onset of confusion and disorder, frequent envelopments, high prisoner counts, or any other phenomena that suggests inability to adapt to change and shock."[75] Boyd explicitly stated that maneuver conflict exists against an opponent's mental dimension.[76] Boyd's career-long theme of relational actions appeared most often in his descriptions of maneuver conflict conducted in the mental dimension. It is here in the mental dimensions where one's actions can send false mental images to the enemy, through

[75] Boyd, *Patterns of Conflict*, 134.

[76] Boyd, "Patterns of Conflict Transcript," 134. "So if you look at this, the content of this has a heavy, what? Mental content. Whereas attrition has a heavy, what? Physical content. So we're back to the moral, mental and physical. The attrition is related primarily to the physical and the maneuver related to the mental. So you can leverage that guy."

deception and ambiguity. Here those fast transients can be exploited by operating at a faster O-O-D-A tempo than your enemy.

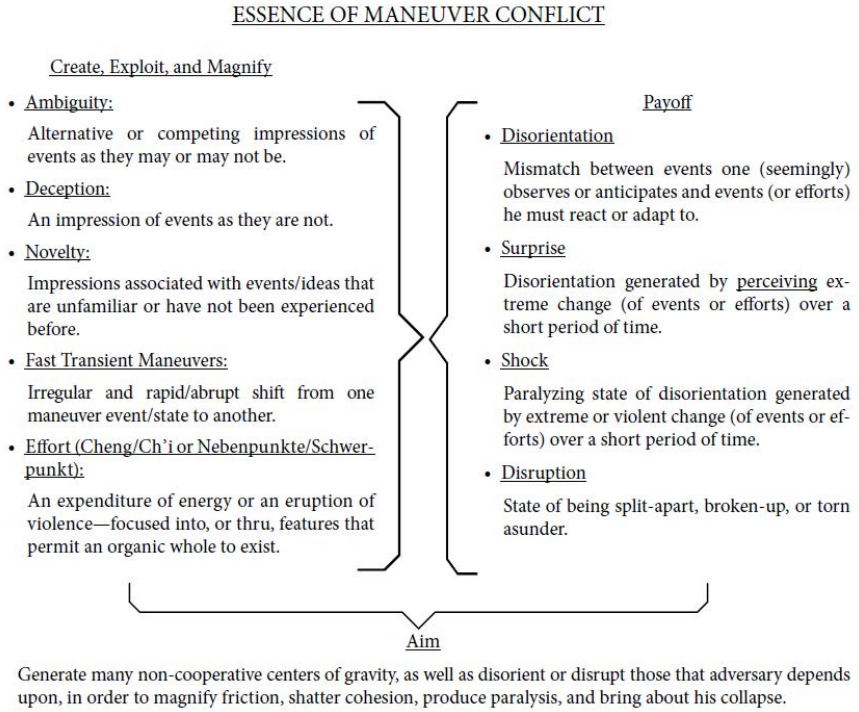

Figure 2. Essence of Maneuver Conflict. John Boyd, "Patterns of Conflict" in *Discourse on Winning and Losing*, ed. by Grant T. Hammond (Maxwell Air Force Base: Air University Press, 2018), 135.

Moral Conflict – Psychological Dimension

What Boyd described as *Moral Conflict* might better be termed psychological conflict; it should remain distinct from mental conflict. In *Patterns* Boyd cited Sun Tzu and J. F. C Fuller in capturing the concept of an enemy forcing a psychological collapse on the enemy, "produce uncertainty, doubt, mistrust, confusion, disorder, fear, panic…."[77] In his historical analysis, Boyd also credited Clausewitz for introducing moral forces in battle, which Boyd combined with his concept of moral conflict: "Psychological/moral forces and effects (danger, intelligence,

[77] Boyd, *Patterns of Conflict*, 120. Boyd is speaking about the psychological effects of Blitzkrieg and guerrilla tactics on an opponent. "Such amorphous, lethal, and unpredictable activity by blitz and guerrillas make them appear awesome and unstoppable which altogether produce uncertainty, doubt, mistrust, confusion, disorder, fear, panic . . .and ultimately collapse—a notion implied by Sun Tzu around 400 B.C. and more recently by J.F.C. Fuller after observing the impact of Ludendorff's infiltration tactics in 1918."

emotional factors,[…]) either impede or stimulate activity."[78] Confusingly, Boyd also used the term moral in a more traditional definition when he discussed strategy as it related to guerilla warfare, national strategy, or developing the means to resist psychological pressure at the tactical level.[79] At the core of Boyd's concept of Moral Conflict, he described three means by which to impose friction upon the enemy—menace, uncertainty, and mistrust—intended to create fear, anxiety, and alienation in an enemy formation.[80] To emphasize the importance of the moral dimension, Boyd quoted Napoleon: "Remember what Napoleon said: the moral is to the physical as three is to one. Now whether it's three to one or ten to one or five to one or two to one, or whatever you want, the point is the moral is much more important than the physical. And you better understand that, because that's where you're going to gain enormous leverage on your adversary."[81] According to Boyd, the exemplar of the moral, or psychological dimension of conflict were the campaigns of Genghis Khan, particularly in central Asia. When analyzing the Mongol campaigns, Boyd asked "Even though outnumbered, why were Mongols able to maneuver in widely scattered arrays without being defeated separately or in detail?"[82] To which he concluded, "Subversive propaganda, clever stratagems, fast breaking maneuvers, and calculated terror not only created vulnerabilities and weaknesses but also played upon moral factors that drain away resolve, produce panic, and bring about collapse."[83] Figure 3 is a slide Boyd used to illustrate his salient points of his view on Moral Conflict.

[78] Boyd, *Patterns of Conflict*, 57.

[79] Ibid., 110.

[80] Ibid., 142.

[81] Boyd, "Patterns of Conflict Transcript," 7.

[82] Boyd, *Patterns of Conflict*, 44.

[83] Boyd, *Patterns of Conflict*, 45.

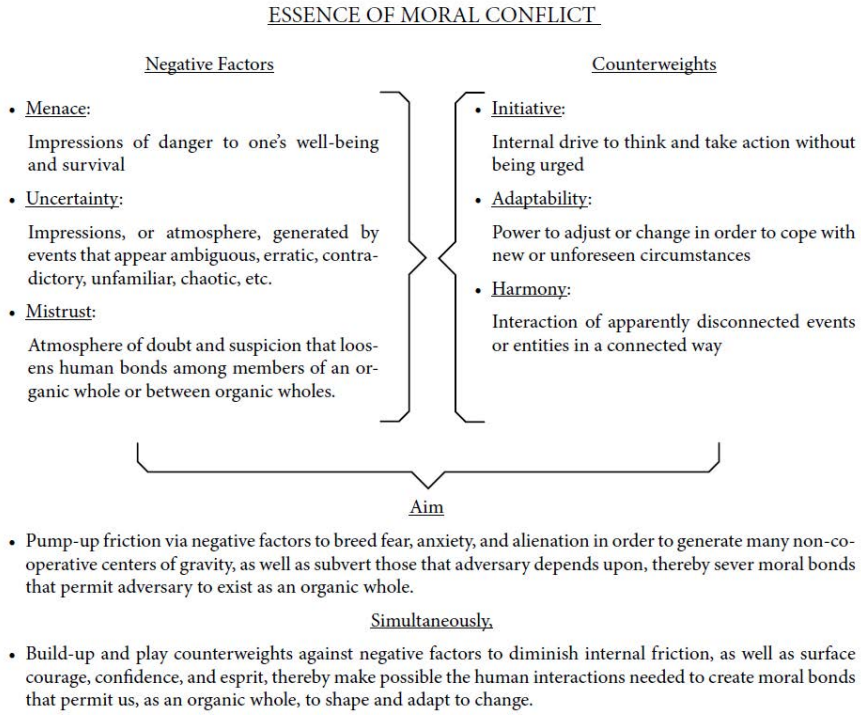

Figure 3. Essence of Moral Conflict. John Boyd, "Patterns of Conflict" in *Discourse on Winning and Losing*, ed. by Grant T. Hammond (Maxwell Air Force Base: Air University Press, 2018), 145.

OODA

The most well-known concept John Boyd introduced was his Observe-Orient-Decide-Act cycle for decision making.[84] Chairman of the Joint Chiefs of Staff General Martin Dempsey quoted the concept in a 2012 white paper, as "the spirit of mission command in the Joint Force 2020."[85] This is the ultimate expression of his career-spanning interest in two adversarial forces working against each other with speed of decision and action determining a winner. The idea first appeared in his "Aerial Attack Study."[86] In the *Patterns* briefing, Boyd first described the OODA

[84] Charles Krulak, "Letter to the Editor," *Inside the Pentagon*, No. 11, Vol. 13, (1997), 5. The obituary written by then Commandant of the Marine Corps General C. C. Krulak read, "Thousands of officers in all our services knew John Boyd by his work on what was to be known as the Boyd Cycle or OODA loop."

[85] Marin Dempsey, "Mission Command White Paper," Joint Chiefs of Staff (2012), 4.

[86] Boyd, *Aerial Attack Study*, 49. While there is no direct mention of the OODA Loop, which isn't formalized until the *Patterns of Conflict* briefing, one can see its nascent beginnings in "Part II – Fighter vs Fighter."

cycle as an idea born from his pilot experience, and he applied the idea to all subsequent concepts that he presented. To Boyd, all forces from individuals through nations executed a cycle to understand. First, he argued, one observes their surroundings, then "you generate images, views, and impressions in your mind. That's what you call orientation. Then as a result of those images, views, and impressions, you're going have to make a selection, what you're going to do or what you're not going to do, that's a decision. And then you're going to have to implement or take the action."[87] Because you are doing this decision cycle, your adversary is conducting it at the same time. This inherent relational concept of the OODA loop is the key concept to achieving advantage over your adversary, by conducting your cycle faster than your enemy. One can trace this same thread back through his "Aerial Attack Study," "Energy Maneuverability Theory," and "Destruction and Creation." Boyd stated:

> [The] idea of fast transients suggests that, in order to win, we should operate at a faster tempo or rhythm than our adversaries—or, better yet, get inside adversary's Observation–Orientation–Decision–Action time cycle or loop. Why? Such activity will make us appear ambiguous (unpredictable) 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.[88]

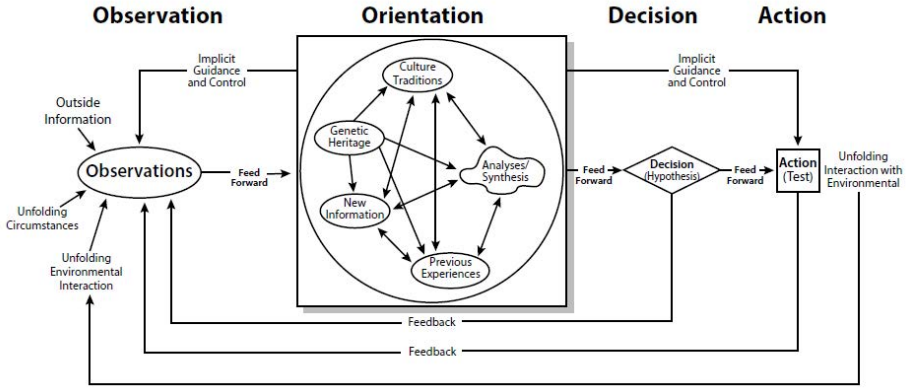

Figure 4. OODA Loop. John Boyd, "Patterns of Conflict" in *Discourse on Winning and Losing*, ed. Grant T. Hammond (Maxwell Air Force Base: Air University Press, 2018), 319.

[87] Boyd, "Patterns of Conflict Transcript," 11.

[88] Boyd, *Patterns of Conflict*, 29.

An Alternate Portrait of Ruin – Theme for Disintegration and Collapse

Boyd concluded certain themes from his selective survey of military history in *Patterns of Conflict* and combined these afore mentioned concepts, presenting them as an "alternate portrait of ruin," which he titled, "Theme for Disintegration and Collapse."[89] By simultaneously conducting conflict in the physical dimension with attrition, the mental dimension with maneuver, and the moral dimension with psychology, you can induce enough friction on your enemy to break apart and isolate his centers of gravity to "destroy adversary's moral-mental-physical harmony, produce paralysis, and collapse his will to resist."[90] By implicitly adding the concept of the OODA loop (it is implied throughout the rest of *Patterns of Conflict*), Boyd argued that one could "Render [the] adversary powerless by denying him the opportunity to cope with unfolding circumstances."[91]

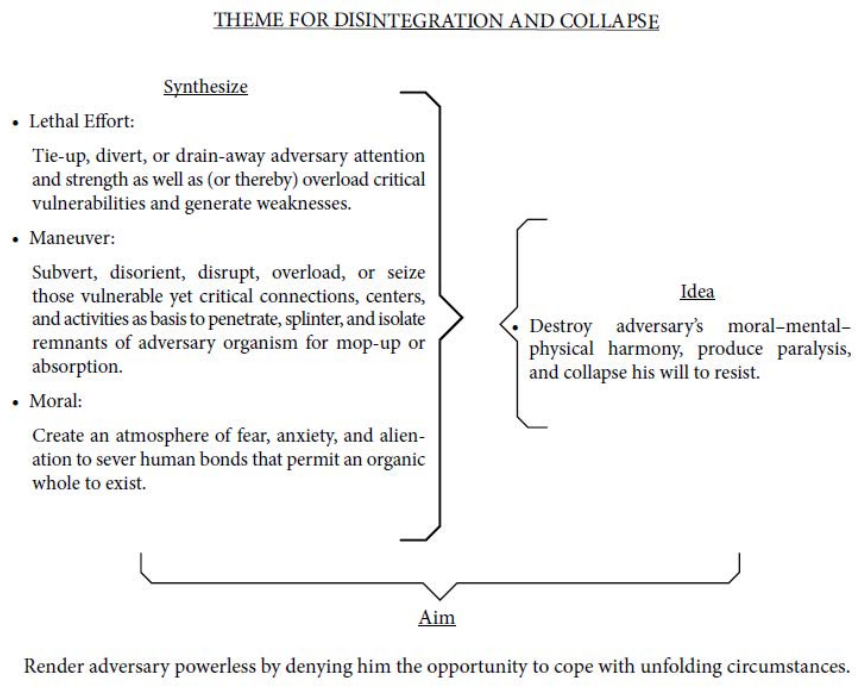

Figure 5. Theme for Disintegration and Collapse. John Boyd, "Patterns of Conflict" in *Discourse on Winning and Losing*, ed. by Grant T. Hammond (Maxwell Air Force Base: Air University

[89] Boyd, *Patterns of Conflict*, 163.

[90] Ibid.

[91] Ibid.

Press, 2018), 157.

The format and style of *Patterns of Conflict* was not that of a time-conscious how-to instructional briefing, but a dialectical discussion and survey meant to elicit reoccurring trends of successful military operations. However, looking at the core concepts mentioned earlier, one can see how they build upon each other and ultimately arrive at the theme of disintegration and collapse:

1. Variety/Rapidity: One's military force utilizes variety/rapidity, fighting with a wide repertoire of actions and multiple thrusts, thereby presenting ambiguity to generate mental confusion and disorder in the mind of the enemy.[92]

2. Harmony: Working under a common cause or clear commander's intent allows one's force, at echelon, to work as a cohesive system, thereby enabling initiative.[93]

3. Initiative: Units have the freedom to adapt to unfolding circumstances and they can freely seize and exploit opportunities pursuant to their commander's intent.[94]

4. *Schwerpunkt* (Decisive Point): A decisive point indicated by the commander which acts "as a center or axis or harmonizing agent that is used to help shape commitment and convey or carry-out intent…an image around which: Maneuver of all arms and supporting elements are focused to exploit opportunities and maintain tempo of operations."[95]

5. Fast Tempo/Fluidity: Applying friendly forces' strength against enemy weakness, along the path of least resistance and adapting to events as they unfold.[96]

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[92] Boyd, "Patterns of Conflict Transcript," 132.

[93] Ibid., 19.

[94] Boyd, "Patterns of Conflict Transcript," 19.

[95] Ibid., 100.

[96] Ibid., 20. "Fluidity of action. Why? Three things you can get advantage of from that, what do you get? One, gives you the opportunity to do what? Strength against weakness. That's one idea that comes out of it. The idea of moving along paths of least resistance. And the third idea from fluidity is what? The idea of being fluid and you're what? You're adapting."

6. Dispersion and Concentration: Decentralized units working as a cohesive system, in harmony and under a clear commander's intent, concentrate their force on a decisive point and then disperse to maintain speed of action and while portraying only ambiguity to the enemy.[97]

7. OODA: Execute a decision cycle at a faster tempo than enemy forces, confounding their understanding by keeping them stuck between observing and acting, or slowing their ability to act or react.[98]

8. Surprise/Shock: Disorient the enemy by creating perception mismatches through extreme changes in events or efforts with a goal of a degree beyond surprise to shock, which generates command paralysis.[99]

9. Physical-Mental-Moral: Conduct actions simultaneously in the physical dimension with firepower to destroy, mental dimension with maneuver to dislocate and moral dimension with psychological dimension to defeat your enemy, injecting enough friction to isolate the bonds of their centers of gravity, disrupting their cohesive systems (harmony) and inducing collapse of their will.[100]

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[97] Ibid., 28.

[98] Boyd, *Patterns of Conflict*, 197.

[99] Ibid., 135.

[100] Boyd, *Patterns of Conflict*, 164.

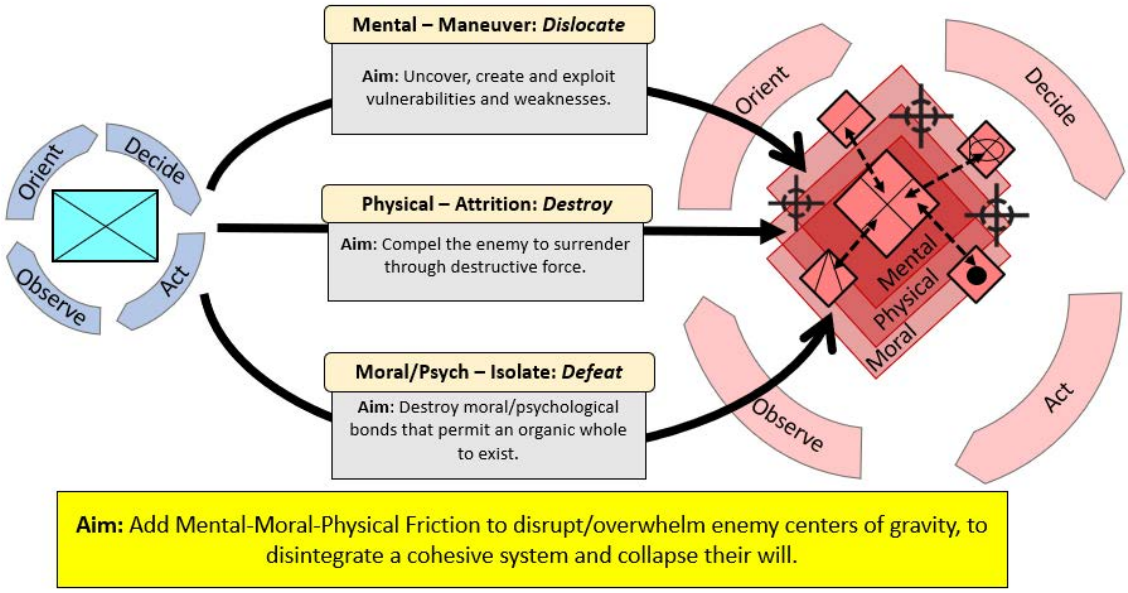

Figure 6. Alternate Portrait of Ruin. Created by Author.

AirLand Battle

FM 100-5 Operations 1982 and 1986

Many have written about the origin of the 1982 edition of FM 100-5 and its shift to a maneuver-focused doctrine.[101] The 1976 edition, named "Active Defense," was met with mixed reactions and, in Kretchik's words, "unleashed an intellectual tempest within the Army."[102] The 1982 manual introduced a new operational concept known as AirLand Battle, which it described as a new "US Army operational doctrine involving maneuver, firepower, and movement; combined arms warfare…. It emphasizes tactical flexibility and speed as well as mission orders,

[101] Walter E. Kretchik, *U.S. Army Doctrine*, 210; John Romjue, *From Active Defense to AirLand Battle: The Development of Army Doctrine, 1973–1982* (Fort Monroe, VA: US Army Training and Doctrine Command Historical Office, 1984), iii.

[102] Kretchik, *U.S. Army Doctrine*, 201.

initiative among subordinates and the spirit of the offense."[103] Much of the same writing team developed the 1986 version of FM 100-5, which updated the AirLand battle concept.[104]

Examination and comparison of the 1982 and 1986 versions of FM 100-5 reveals a focus on systems centric warfare, and war as a human endeavor, two themes at the core of Boyd's ideas. Todd Larsen, in his 2012 Advanced Military Studies Program monograph, examined the relationship between John Boyd's ideas and AirLand Battle, and found three significant similarities: the OODA loop, operational art and the operational level of war, and decentralized command and control.[105] While Larsen made convincing arguments for these similarities, at least four other similarities deserve attention; the doctrine's thesis, imperatives, systems focus, and the human dimension of conflict.

One can see parallels between John Boyd's core concepts and AirLand Battle doctrine's thesis. Per the 1982 edition of AirLand Battle, the "object of all operations is to destroy the opposing force."[106] Further:

> This doctrine is based on securing or retaining the initiative and exercising it aggressively to defeat the enemy. Destruction of the opposing force is achieved by throwing the enemy off balance with powerful initial blows from unexpected directions and then following up rapidly to prevent his recovery. The best results are obtained when initial blows are struck against critical units and areas whose loss will degrade the coherence of enemy operations, rather than merely against the enemy's leading formations…. Our operations must be rapid, unpredictable, violent, and disorienting to the enemy. The pace must be fast enough to prevent him from taking effective counteractions.[107]

Despite the stated intent of destroying enemy forces, the method of controlling the tempo by retaining the initiative, disrupting the enemy coherent system (throwing the enemy off balance), and exploiting rapidity and ambiguity align closely with John Boyd's ideas. The writers altered

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[103] US Army, FM 100-5 (1982), i.

[104] Walter E. Kretchik, *U.S. Army Doctrine,* 211.

[105] Todd Larsen, "John Boyd and AirLand Battle," 33-34.

[106] US Army, FM 100-5 (1982), 2-1.

[107] Ibid.

the thesis of the doctrine slightly, yet significantly, by changing the object to a definition more in line with Clausewitz and Boyd, and importantly added the point of view of the enemy:

> The object of all operations is to impose our will upon the enemy to achieve our purposes. To do this we must throw the enemy off balance with a powerful blow from an unexpected direction, follow up rapidly to prevent his recovery and continue operations aggressively to achieve the higher commander's goals. The best results are obtained when powerful blows are struck against critical units or areas whose loss will degrade the coherence of enemy operations in depth, and thus most rapidly and economically accomplish the mission. From the enemy point of view, these operations must be rapid, unpredictable, violent, and disorienting. The pace must be fast enough to prevent him from taking effective counteractions.[108]

With the addition of the enemy perspective, we can see some of the same ideas that Boyd espoused: "We're throwing variety and rapidity at our adversary. It allows you to magnify adversary friction, stretch out his time to respond in directed ways. It will take him longer to cope."[109] It also reads similar to Boyd's conclusion of the "game" in *Patterns of Conflict*: "Penetrate adversary organism to sever his moral bonds, disorient his mental images, disrupt his operations, and overload his system, as well as subvert, shatter, seize, or otherwise subdue those moral–mental–physical bastions, connections, or activities that he depends upon…thereby pull adversary apart, produce paralysis, and collapse his will to resist."[110]

The 1982 edition of AirLand Battle introduced six Combat Imperatives, which grew to nine in the 1986 edition and were retitled AirLand Battle Imperatives. By comparing these imperatives to Boyd's corresponding ideas one can see that they align very closely (see Table 1). That said, Boyd's synthesized ideas, like non-cooperative centers of gravity, decision cycles, or moral-mental-physical conflict, do not align with the AirLand Battle Imperatives as closely as his simpler core concepts.

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[108] US Department of the Army, Field Manual (FM) 100-5, *Operations* (Washington, DC: Government Publishing Office, 1986), 14.

[109] Boyd, "Patterns of Conflict Transcript," 171.

[110] Boyd, *Patterns of Conflict*, 204.

Table 1. AirLand Battle Imperatives.

Imperative	Boyd Concept
Ensure unity of effort.	Harmony, Friction
Anticipate events on the battlefield.	Initiative (Commander's Intent)
Concentrate combat power against any vulnerabilities.	Concentration/Dispersion, Maneuver Conflict, Noncooperative centers of gravity
Designate, sustain, and shift the main effort.	*Schwerpunkt* (Decisive Point)
Press the fight.	Rapidity
Move fast, strike hard, and finish rapidly.	Surprise/Shock, Rapidity
Use terrain, weather, deception and OPSEC.	Ambiguity/Deception
Conserve strength for decisive action.	Concentration/Dispersion, *Schwerpunkt* (Decisive Point)
Combine arms and sister services to complement and reinforce.	Variety/Rapidity, Surprise/Shock[111]
Understand effects of the battle on soldiers, units, and leaders.	Moral Conflict

Created by the Author.

Table 2. Word Frequency of John Boyd's Ideas in AirLand Battle.

Boyd Concept	1982 (186 pgs)	1986 (187 pgs)
Friction	0	5
Rapidity (rapid)	1 (107)[112]	4 (135)[113]
Variety	4	12
Concentration	83	138
Dispersion	38	42
Harmony (cohesion)	0 (7)	4 (21)
Initiative	68	94
Ambiguity	3	4
Deception	52	84
Surprise/Shock	54/13	67/14
Paralysis	2	5
Center of Gravity	0	30
OODA (decision cycle)	0	0 (3)
Firepower/Attrition	35/4	37/5
Maneuver	276	302
Moral (Morale)/Psychological	14/35	20/42
Synchronize	27	91

Created by the Author.

[111] Boyd, "Patterns of Conflict Transcript," 22. Boyd utilized Sun Tzu's Cheng (ordinary) and Chi (extraordinary): "So when you're using combined arms, in a sense if you do it correctly, you're doing the cheng/chi game."

[112] Rapidity is mentioned only once, from Sun Tzu contextual quote on rapidity at the beginning of chapter 2. Rapid is used 50, and rapidly 57 times.

[113] Rapidity is used 4 times, however rapid is used 71 times, and rapidly 64 times.

John Boyd's *Patterns of Conflict* and AirLand Battle both describe units as cohesive systems which must be disrupted. AirLand battle focused on this in two significant ways: the addition of Depth as one of the four tenets of AirLand Battle, and the adoption of the Close, Deep and Rear Operational Framework. The tenet of Depth instructed readers to visualize the battlefield not just as the forward line of troops where engagements occur, but to include the rear where support forces are found. This consideration, explained in the Close, Deep and Rear framework, visualized a cohesive force that an enemy could critically affect by disrupting its ability to work as systematic whole. The doctrine reads, "In tactical actions, commanders fight the enemy throughout the depth of his dispositions with fires and with attacks on his flanks, rear, and support echelons. Such operations in depth degrade the enemy's freedom of action, reduce his flexibility and endurance, and upset his plans and coordination."[114] Boyd voiced a similar idea when discussing surfaces and gaps in *Patterns of Conflict*: "you're trying to penetrate his system. And then isolate, break down their organic integrity, and then scarf up the components…in detail. Which you cut them off in all levels from their supporting…and nourishing elements."[115] This definition is also in keeping with Boyd's aforementioned admonition to "sever those interacting bonds that permit him to exist as an organic whole."[116] Huba Wass de Czege, principle author of the AirLand Battle doctrine, reflected on its development:

> Concepts were in place [in the original AirLand Battle doctrine of 1982] to enable thinking of major operations and campaigns as endeavors in pursuit of systemic defeats of opposing army and front level offensive formations. But the articulation of this idea was awkwardly done. We were wrapping our mind around how to put into practice the "synchronization" of the close, deep, and rear "battle," when we really should have thought in terms of interdependent close, deep, and rear operations.[117]

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[114] US Army, FM 100-5 (1986), 16-17.

[115] Boyd, "Patterns of Conflict Transcript," 163.

[116] Boyd, *Patterns of Conflict*, 158.

[117] Huba Wass de Czege, "In Pursuit of AirLand Battle 2.0: Lessons (in Brief) From Version 1.0", unpublished. He added "*We did not even once label this as "systems thinking," but of course it is. I believed then, and still do, that our best intuitive commanders were successful because they naturally made sense of their mission-world by organizing ((systematizing)) what they knew.*" Emphasis in the original.

Wass de Czega said in 2006, "The battlefield framework may have been a spatial one of close, deep and rear areas, but the conceptual emphasis was on the synergy of organizational functions taking place in those areas during performance of the mission, in a contest with an opposing force also performing such functions."[118]

The last similarity between AirLand Battle and John Boyd's key ideas was the human dimension of warfare. At the beginning of *Patterns of Conflict*, Boyd said: "One thing I want to point out, and I'm going to make it again and again. Terrain does not fight wars. Machines don't fight wars. People do it and they use their minds. So you better understand the people, because if you don't understand them, you ain't going to make it, period."[119] Starting in 1982, AirLand Battle focused on the human dimension. Per the manual, "Leadership is the crucial element of combat power," and "*The primary function of leadership is to inspire and to motivate soldiers to do difficult things in trying circumstances*."[120] The final imperative of "Understand the effect of battle on soldiers, units, and leaders" in the 1986 edition highlights the focus on the human dimension. Further, in chapter one, the section "meeting the challenges" prioritized the human dimension: "Superior performance in combat depends on three essential components. First and foremost, it depends on superb soldiers and leaders with character and determination who will win because they simply will not accept losing. Next, it depends on a sound, well-understood doctrine for fighting. Finally, it depends on weapons and supporting equipment sufficient for the task at hand."[121] John Boyd would later echo this sentiment before the House Armed Services

[118] Huba Wass de Czege, "Lessons from the Past: Making the Army's Doctrine 'Right Enough' Today," *Institute of Land Warfare*, Association of the United States Army, No. 06-2, (September 2006): 10.

[119] Boyd, "Patterns of Conflict Transcript," 3.

[120] US Army, FM 100-5 (1982) 2-5. Emphasis in the original.

[121] US Army, FM 100-5, (1986) 5. Emphasis in the original.

Committee in 1991: "People, ideas, hardware. In that order."[122] Wass de Czege later stressed, "To the foundational understanding of the physical dimension of modern war, this manual added the enduring complexities of the human dimension—the effects of fear, fatigue, fog, friction and leadership."[123] The 1986 version of AirLand battle mentions friction five times, four times in how the phenomenon effects friendly activities and plans, but once where it effects both forces. "Friction- the accumulation of chance errors, unexpected difficulties, and the confusion of battle- will impede both sides."[124] This is as close as either version of AirLand battle come to Boyd's concept of inducing friction onto the enemy to generate noncooperative centers of gravity and bring about collapse.

Conclusion

Ian T. Brown asked in his book on Boyd's influence on US Marine Corps doctrine, "Did Boyd Influence the Army?"[125] One of Boyd's former acolytes, James Burton, claimed that "the Army threw out most of the dinosaurs' philosophy and embraced the philosophy espoused by Boyd," and further that Major General Donald Morelli, TRADOC Deputy Chief of Staff for Doctrine, gave a briefing to several senior US Air Force leaders at the Pentagon that "bore a remarkable similarity to Boyd's theories. Morelli, exploding into a tirade, claimed that the ideas were all original and not taken from Boyd's work."[126] Biographer Grant T. Hammond claimed in his book on Boyd, in the section titled "Instilling Maneuver Warfare in the United States," that the AirLand Battle doctrine "was in development for several years and sought to replace the

[122] John Boyd, "U.S. Military Reform After Oper. Desert Storm" House Armed Services Committee, on C-SPAN, April 30, 1991, 7:53 to 10:15, accessed March 15, 2021, https://www.c-span.org/video/?17753-1/us-military-reform-oper-desert-storm.

[123] Huba Wass de Czege, "Lessons from the Past," 9-10.

[124] US Army, FM 100-5 (1986) 16.

[125] Brown, *A New Concept of War*, 100.

[126] James G. Burton, *Pentagon Wars* (Annapolis, MD: Naval Institute Press, 1993), 55.

Army emphasis on firepower and attrition with a more fluid doctrine based on maneuver and deception."[127] On the contrary, AirLand Battle was not in development for several years; writing began in early 1980 and it was finished in latter half of 1981.[128]

Boyd's ideas spread through his hundreds of briefings of *Patterns of Conflict*, and the authors of AirLand Battle were aware of them. In June of 1982, months before the doctrine was published, Wass de Czege briefed the West Point Senior Conference on the Defense Reform Movement, which John Boyd and Bill Lind both attended, and he refuted charges that the Army doctrine was fundamentally flawed because it espoused purely attrition warfare.[129] In the debate, Wass de Czege challenged Boyd's OODA cycle as a sole means to achieve victory by highlighting what he argued were questionable assumptions: (1) that contemporary professional armies are easy susceptible to psychological disorientation and collapse, (2) that purposeful ambiguity can telegraph the intended message to your adversary, and (3) that numbers do matter. Wass de Czege credited Boyd's appreciation of Clausewitz's concept of friction and went on to cite numerous military notables (many of which Boyd drew from for *Patterns of Conflict)* to discredit what he perceived as a false dichotomy between attrition and maneuver warfare.[130] In so doing, Wass de Czega made a key argument that Boyd himself could have authored:

> The German Wehrmacht of the 1930s did not invent the blitzkrieg; instead, they adapted it to their time. The idea central to blitzkrieg was described by Sun Tzu about 500 B.C. 'Rapidity is the essence of war; take advantage of the enemy's unreadiness, make your way by unexpected routes, and attack unguarded spots.' It was practiced by military leaders who never read Sun Tzu—Alexander the Great, Hannibal, Genghis Khan, Julius Caesar, Frederick the Great, Napoleon, and others. When the idea was borrowed by Zhukov and Patton, it had to be adapted to the circumstances of the Russian and

[127] Hammond, *The Mind of War,* 154.

[128] Romjue, *From Active Defense to AirLand Battle,* 53.

[129] Huba Wass de Czege, "Army Doctrinal Reform," in *The Defense Reform Debate*, ed. Asa A. Clark IV, Peter W. Chiarelli, Jeffrey S. McKitrick, and James W. Reed (Baltimore: The John Hopkins University Press, 1984), 101.

[130] Ibid., 103.

American armies.[131]

When he was writing the 1982 version of AirLand Battle, Wass de Czege sent drafts to the principle critics in the reform movement, including Boyd, Lind, and Edward Luttwak, inviting them to comment and hold private discussions with authors.[132] Later, while serving as the first director of the School of Advanced Military Studies, Wass de Czege invited Boyd to speak to the students and faculty six times, and said Boyd "challenged the Army, people like me."[133]

Boyd held a semi-positive view of AirLand Battle doctrine, and a high regard of its principle author, Huba Wass de Czege. Offering testimony to the House Armed Services Committee in 1991 after Operation Desert Storm, Boyd credited Wass de Czege for having

> the tenacity and insight to dig deep into combat history and military theory.... Despite resistance he was able to form a team to rewrite 100-5 and even more amazingly, he had the courage to completely overturn the tradition bound 1976 version of 100-5. His 1982 version introduced an untraditional philosophy of maneuver warfare. Based upon an integrated effort of initiative, agility and deep attack behind enemy lines. The Army refined and updated this manual in 1986 with no change in basic philosophy. Thus showing that these new ideas had taken root… And so, in their system, particularly at the TRADOC level, why you're beginning to see that these ideas are really defusing in a really broad sense throughout the US army, and likewise at Leavenworth.[134]

Boyd's characterization of overturning the "tradition bound 1976 version of 100-5" might have been unfair, as the Army was trying to return its focus to training for high intensity warfare in the aftermath of Vietnam, and it published the manual's Active Defense.[135] While Boyd praised initiative, agility, and depth, he passed over synchronization, which he lambasted in his subsequent briefings of *Patterns of Conflict*, "They've got those four things up front: depth, synchronization, agility, and initiative. Agility and initiative are good. Depth, there's nothing wrong with it, except it's in the wrong part of the manual, it should be in the back, getting lower

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[131] Wass de Czege, "Army Doctrinal Reform," 105.

[132] Wass de Czege, "Lessons from the Past," 9.

[133] Huba Wass de Czege, phone conversation with author, February 13, 2021.

[134] John Boyd, "U.S. Military Reform After Oper. Desert Storm" 13:06 to 15:00.

[135] Romjue, *From Active Defense to AirLand Battle*, 5.

with agility and initiative. Synchronization's a disaster. You don't synchronize human beings, you synchronize watches. If harmony is higher, then they should use harmony instead of synchronization. Synchronization is part of harmony, but harmony is not necessarily part of synchronization."[136] The authors of AirLand Battle had originally chosen the term concentration but were assigned to use the word synchronization by General William DePuy.[137] Ostensibly, Boyd's criticisms of synchronization align with the first paragraphs of the manual's description: "Synchronization is the arrangement of battlefield activities in time, space and purpose to produce maximum relative combat power at the decisive point."[138] Further reading of the description belies this criticism however, as a careful reader can see the doctrine authors attempting to describe a larger process that is not merely "concentrating of fires and forces at the decisive point."

> Synchronization need not depend on explicit coordination if all forces involved fully understand the intent of the command… To achieve this requires anticipation, mastery of time-space relationships, and a complete understanding of the ways in which friendly and enemy capabilities interact. Most of all, it requires unambiguous unity of purpose throughout the force.[139]

The proceeding doctrine, *Active Defense* was exclusively focused on the battlefield of central Europe, and while AirLand battle has been said to address the same problem, unlike Active Defense, it is a much broader doctrinal concept which generalized land warfare of its time.[140] The authors were very well versed in military history, theory, and doctrine. They simultaneously formed both a concept and a doctrine when writing the AirLand Battle manual in the wake of the critical response to its predecessor, Active Defense. One can find many of John Boyd's ideas in AirLand Battle, because the authors drew upon a wide range of examples and

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[136] John Boyd, "Patterns of Conflict Transcript," 36.

[137] Richard H. Sinnreich, phone conversation with author, March 23, 2021.

[138] US Army, FM 100-5 (1986), 17.

[139] Ibid., 18.

[140] Romjue, *From Active Defense to Airland Battle*, 6.

patterns of successful land warfare that Boyd employed in his own theorizing. Maneuver, rapidity, concentration and dispersion, initiative, surprise and shock, the human dimension of conflict, deception, and centers of gravity all feature prominently in the doctrine. The similarities end however, where Boyd took those ideas and further synthesized the OODA Loop, injecting friction into the enemy systems, noncooperative centers of gravity, and simultaneous conflict on the moral-mental-physical dimension. The authors did not make Boyd's influence on their thinking explicit, but comparison of the language in AirLand Battle doctrine to Boyd's key concepts demonstrates too much similarity to be purely coincidence.

In contrast, AirLand Battle doctrine mentioned decision cycles, but not in a way that reflects the complexity of Boyd's OODA loop; nor does Boyd's theme of disintegration and collapse across the moral-mental-physical dimensions of war appear in either the 1982 and 1986 versions of FM 100-5, *Operations*. That said, subsequent doctrine did highlight these concepts. The 1996 Joint Publication on Command and Control Warfare included an appendix on the OODA loop called "the decision cycle," and the 2003 Field Manual 6-0, *Mission Command: Command and Control of Army Forces* not only included a similar appendix, but also referenced the decision cycle seven times with respect to the topics of time, situational understanding, battle command, information sharing, exploiting the initiative, and assessments. The OODA cycle appears twenty-four times in the manual.[141]

US Army doctrine rarely credits its theoretical influences, but this should change. Just as operational art bridges execution of tactical action and achievement of the strategic aim, doctrine serves as the link between theory/operational concepts and action in the field. Explicit reference to theory in doctrine would lift the fog that obscures this relationship, supplying a clear foundation from which to view the published concepts. Doctrine is not meant to be prescriptive,

[141] US Department of the Army, Field Manual (FM) 6-0, *Mission Command: Command and Control of Army Forces* (Washington, DC: Government Publishing Office, 2003).

and the opportunity to encourage readers to reach back to the larger ideas that influenced ideas for current warfighting would be important and insightful. AirLand Battle was certainly a strong river of ideas, fed by the confluence of important thinkers, many of whom have been acknowledged widely. Directly or indirectly the tributary of John Boyd's ideas at the very intellectually vibrant period of the late 1970s show up in AirLand Battle, although his most significant synthesized conclusions do not. One cannot deny Boyd's influence on US Army operational concepts, but the fact that the doctrine does not reference his body of work has left it up for debate, while simultaneously making it difficult for those who seek to understand and employ that doctrine to embark on a study of its deeper meaning.

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