

JOHN BOYD

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“Forty-Second Boyd.” “The Mad Major.” “Genghis John.” “The Ghetto Colonel.” These are some of the sobriquets attached to Col. John R. Boyd, United States Air Force (Ret.). A true son of the Cold War, Boyd's career began with the descent of the Iron Curtain, and ended after the collapse of the Berlin Wall and the ensuing peace dividend. During that time, Boyd's questing intellect and hard-nosed personality put him in the center of national defense issues—from aircraft design to conflict theory—in a way that few others could boast. His intellect shaped fighter tactics and military doctrine. His sharp elbows eventually made him a pariah within his own branch of service. But the passage of time has made one thing clear. He cared, with passionate purity and the relentlessness of an avalanche, about useful ideas. At the time of his death, Boyd's intellectual journey had run the gamut of aerial combat tactics to strategies for wholesale national survival, and influenced, to varying degrees, many of the American armed Services. The Air Force took his tactical knowledge and aircraft designs but otherwise wished he would go away. The Army quietly listened and, while eschewing the wholesale adoption of his ideas, nevertheless allowed him to influence their own reform efforts. The Marine Corps not only listened, but loudly and proudly turned Boyd's concepts into the bedrock of its philosophy of

war. This article cannot do justice to the breadth of his career, but will highlight those experiences that shaped Boyd's ever-evolving views on war, and illustrate how they came to influence modern conceptions of conflict across myriad institutions.

John R. Boyd was born January 23, 1927, in Erie, Pennsylvania, and shared the hardships experienced by many Americans during the Great Depression.¹ Boyd's family circumstances during the Depression—the fourth of five children and losing his father when he was 3 years old—resulted in a significant degree of personal independence, described as having “a lot of freedom to do things as long as I tended to produce.”² Boyd repaid this latitude by driving himself to “produce” in all things, especially the realms of athletics and academics.³ From this childhood, Boyd developed two characteristics that shaped his future: a fierce desire to operate on his own, doing things his own way; and an equally fierce determination to maximize self-study and deliver useful products to repay this independence.

¹ Boyd official military records, box 9, folder 6, “Research Material (14 of 18),” Robert Coram Collection, Personal Papers Collection, Archives and Special Collections Branch, Library of the Marine Corps, Quantico, VA; David R. Mets, “Boydmania,” *Air & Space Power Journal* (Fall 2004), 100.

² John R. Boyd, “U. S. Air Force Oral History Interview (Corona Ace Interview),” interview by LtCol John N. Dick, Jr., 28 January, 1977, transcript, box 24, folder 10, Col. John R. Boyd Papers, Personal Papers Collection, Archives and Special Collections Branch, Library of the Marine Corps, Quantico, VA, 2.

³ Such circumstances and their coincident by-products of expectation and personal industry were not unique during the Depression years. Russell Baker, who joined the Army when World War II began, had a similar childhood. He repeatedly noted his mother's expectation that he make something of himself to the point that he felt ashamed when he failed to be productive, especially in supporting the family. Broader studies support this anecdotal evidence. In her survey of Depression-era youth, historian Kriste Lindenmeyer found both increased emphasis on the importance of putting hard work into one's education, and the desire for self-improvement fostered by friendly competition. Interestingly, one of her subjects, in writing about the value of hard work, echoed Boyd's later “to be or to do” mantra: “you have to have ambition—you just can't have ability and personality; you have to work.” In his study of Oakland-area youth, Glen Elder, a sociologist, provided additional support for the commonality of these attitudes. The decline in a Depression-era family's capacity to support individual advancement found a corresponding increase in relying on one's own personal resources for success, accelerated interest in assuming the role of an adult, and self-realized success as an individual status symbol that surpassed family status in importance. Additionally, the influence of mothers on sons in promoting individual achievement was significant, especially in families such as Boyd's and Baker's which lacked a father figure during the Great Depression. See Russell Baker, *Growing Up* (New York, NY: Signet, 1984), 17, 23, 121–122, 156, 212, 228, 233, 239–244; Kriste Lindenmeyer, *The Greatest Generation Grows Up: American Childhood in the 1930s* (Chicago, IL: Ivan R. Dee, 2005), 113, 125, 127, 145, 198; Glen H. Elder, Jr., *Children of the Great Depression: Social Change in Life Experience* (Boulder, CO: Westview Press, 1999), 33, 81, 116, 136, 139, 141, 144.

Boyd initially enlisted in the Army Air Corps at the end of World War II, serving briefly with the Occupational Forces in Japan. He was finally discharged in 1947, and went to school on the G. I. Bill.⁴ He received a commission as a second lieutenant in the newly independent Air Force in July 1951, after the outbreak of the Korean War.⁵ Boyd's competitiveness and desire for personal freedom drove him toward the fighter wing.⁶ In flight school, the determination to produce on his own terms led Boyd to study and practice maneuvers well outside the normal flight training syllabus.⁷ Selected to fly the F-86 Sabre, Boyd was promoted to first lieutenant in January 1953, and finally reached an active combat theater in Korea by March.⁸ While the Korean War was still "hot" at this point, it was also winding down, and Boyd only flew a handful of missions.⁹ Yet, while Boyd never recorded an enemy kill, the contrast in performance between Soviet and American fighter aircraft resonated with him, and he would revisit it later as he developed his warfighting theories.¹⁰

After the Korean War ended, Boyd was reassigned to Nellis Air Force Base in Nevada in March 1954, as an F-86 instructor pilot.¹¹ Unimpressed by the quality of instruction he found at FWS, Boyd approached the commanding officer to volunteer for an undesirable billet in the academics department if he were allowed the freedom to teach tactics as he saw fit.¹² By 1957, Boyd had amended the academic program to his satisfaction. To share these improvements with the wider fighter community, he published a recurring circular entitled the Fighter Weapons

⁴ Boyd, "Air Force Oral History Interview," 5.

⁵ Robert Coram, *Boyd: The Fighter Pilot Who Changed the Art of War* (New York, NY: Little, Brown and Company, 2002), 38; Boyd official military records.

⁶ Boyd, "Air Force Oral History Interview," 6–7.

⁷ *Ibid.*, 8, 15; Coram, *Boyd*, 45, 47; Grant T. Hammond, *The Mind of War: John Boyd and American Security* (Washington, DC: Smithsonian Institution Press, 2001), 33.

⁸ Boyd official military records.

⁹ *Ibid.*; Coram, *Boyd*, 53.

¹⁰ Coram, *Boyd*, 55–56.

¹¹ Boyd official military records; Boyd, "Air Force Oral History Interview," 22–23.

¹² *Ibid.*, 22–25.

Newsletter in June, 1957.¹³ This newsletter showcased two more of Boyd’s trademark characteristics: the free sharing of ideas; and his refusal to accept the rigid, checklist-type approach to problem solving that was common in the military. Instead, he strove to build a repository of experience and knowledge from which one could draw any number of solutions, depending on the unique nature of the problem.

In 1959, Boyd was selected to the Air Force Institute of Technology (AFIT)’s scholarship program at the Georgia Institute of Technology. Determined to prevent the tactics program from languishing after his departure, he wrote his own manual on fighter tactics.¹⁴ The resulting *Aerial Attack Study* was such a thorough piece of work that no significant contributions have been made to fighter tactics since its publication.¹⁵ It also presaged, as did the Fighter Weapons Newsletter, how Boyd later approached conflict theory. In the *Study*, he introduced a new frame of reference—“geometric space relationships”—that had to be understood to provide context for all the maneuvers that would follow.¹⁶ Also, as with the Newsletter, the *Study* threw out the dry list of moves and countermoves that lacked context, and instead taught pilots how to think about combat and the reasoning behind each move and countermove.¹⁷

As Boyd worked through his engineering degree at Georgia Tech, he discovered—accidentally, in the best scientific tradition—the foundation for a ground-breaking development in aircraft performance. While tutoring some fellow students in thermodynamics, Boyd was asked to explain the basics of aviation tactics and maneuvering. Boyd tried to translate pilot-speak into something more scientific:

¹³ Boyd, “Air Force Oral History Interview,” 36.

¹⁴ Coram, *Boyd*, 103.

¹⁵ *Ibid.*, 116; James G. Burton, *The Pentagon Wars: Reformers Challenge the Old Guard* (New York, NY: Naval Institute Press, 2014), 12–13.

¹⁶ John R. Boyd, *Aerial Attack Study (revised 11 August 1964)*, box 13, folder 5, Col. John R. Boyd Papers, Personal Papers Collection, Archives and Special Collections Branch, Library of the Marine Corps, Quantico, VA, 49.

¹⁷ Hammond, *The Mind of War*, 47.

Well, you treat it like we do in [thermodynamics]. You know we talk about air speed, you square it and get kinetic energy. When you talk about maneuvering you talk about changing altitude, air speed and changing direction. You can change altitude and gain air speed by trading off altitude or vice versa by trading kinetic energy for potential energy ... If you make a lot of turns you draw down on your potential, or kinetic or both.”¹⁸

Thinking back on the explanation he had just provided, Boyd had a sudden revelation: “ ‘Gee I wonder why I hadn’t thought of that before? . . . I had never seen anybody treat it from an energy viewpoint and I had just said it by accident.”¹⁹ Boyd scribbled down some initial equations capturing this insight and brought them to his new assignment at Eglin Air Force Base in Florida in 1962.²⁰

Now a major, Boyd continued his inquiry into the relationship between flight performance and energy—aided by government computers to which Boyd gained access under dubious legality—and ultimately codified it as the Energy-Maneuverability (E-M) Theory (figure 1):²¹

¹⁸ John R. Boyd, “United States Air Force Oral History Program: Interview #859,” interview by Jack Neufeld, 23 May, 1973, transcript, box 6, folder 5, Robert Coram Collection, Personal Papers Collection, Archives and Special Collections Branch, Library of the Marine Corps, Quantico, VA, 3–4.

In physics, kinetic energy refers to an object’s energy derived from its current motion, and depends on the object’s mass and speed. Potential energy refers to the latent energy stored in an object as a function of its position; in the case of an aircraft, that is its vertical position or height in relation to the earth or another aircraft. An aircraft in motion always has both kinetic energy, by virtue of its mass and current airspeed, and potential energy based on its altitude. Boyd’s point was that aircraft tactics and maneuvers could be looked at as exchanges of kinetic and potential energy. A maneuver like a dive traded altitude (potential) for airspeed (kinetic); an afterburner climb traded the mass of fuel (kinetic) to rapidly build up altitude (potential). A physicist could thus view aerial combat as fluidly changing energy states.

¹⁹ *Ibid.*

²⁰ Coram, *Boyd*, 137; Boyd official military records.

²¹ Coram, *Boyd*, 145–146.

$$P_S = V \left(\frac{T-D}{W} \right)$$

V = Velocity

T = Thrust

D = Drag

W = Weight

Figure 1.

The theory allowed, for the first time, the calculation of an aircraft's performance based on its design characteristics; or, conversely, one could calculate the optimum aircraft design required to deliver a desired performance.²² For this work, Boyd received two Air Force scientific awards and reassignment to the Pentagon to troubleshoot problems found in the development of the Air Force's latest fighter design.²³ The latter "reward" disappointed Boyd, as it countermanded the assignment he originally desired: deploying to Thailand to fly F-4 Phantoms in combat in Vietnam.²⁴ In October 1966, Boyd reported to the research and development section of Headquarters, United States Air Force.²⁵ His small slice of the Pentagon worked the Air Force F-X project, the follow-on aircraft to the F-111 fighter-bomber.²⁶

²² Ibid., 148.

²³ Ibid., 183–185.

²⁴ Ibid., 184.

²⁵ Boyd official military records; Boyd, "Interview #859," 14.

²⁶ For a supposedly standardized process, military acquisitions projects have dizzying and inconsistent naming conventions; for the purposes of this book, only a handful deserve extensive description. In the Air Force, research or experimental aircraft designs that were still in an early conceptual phase—i.e. no physical airframe yet existed—had an "X" designator. These designs also had a designator for the type of mission the future aircraft was intended to perform: "F" for fighter, "A" for ground attack, "R" for reconnaissance, etc. Thus, the F-X program would design a future fighter aircraft.

When Boyd arrived at headquarters, the F-X program faced many difficulties.²⁷ Boyd and his team applied the E-M formula to craft an airframe that could still deliver the Air Force's desired metrics in a lighter—and less costly—package. With input from NASA, General Dynamics, and Lockheed-Martin, alongside the analysis of hundreds of different configurations, Boyd's team developed a lightweight and maneuverable airframe that would ultimately go into production as the F-15.²⁸

Boyd transferred to Andrew Air Force Base in October 1969 to take the F-15 from paper to reality.²⁹ Yet, despite all his work, Boyd's Air Force superiors at the Pentagon had insisted on last-minute design alterations that ruined the F-15's E-M-derived performance purity.³⁰ Disappointed, Boyd busied himself with two side projects. In the first, he became the E-M sounding board for associate Pierre Sprey, who worked on the contentious A-X project for the Air Force at the Pentagon.³¹ Boyd helped Sprey validate the maneuverability calculations for the aircraft that became the A-10. Boyd's immediate impact on the A-X project proved less important than what Boyd himself took away from it: namely, an interest in German tactics during World War II that arose from his interviews with former *Luftwaffe* pilots in the course of developing the A-X. This interest would pay dividends later in Boyd's work on conflict theory.

Boyd's second side project was far more ambitious. He still dreamed of building a fast, maneuverable, deadly fighter plane with its performance derived from the purity of the E-M equation. From a modest start, Boyd oversaw the development of two prototypes—the YF-17 and YF-16, respectively—that he steadily shepherded into production as the F-16.³² And, as with

²⁷ Boyd, "Interview #859," 15–16; Coram, *Boyd*, 191–192. The Navy used its own variations for conceptual aircraft design projects. "VFAX" would develop a future fixed-wing ("V") dual-role fighter ("F") attack ("A") aircraft.

²⁸ Boyd, "Interview #859," 16–22; Coram, *Boyd*, 221–231.

²⁹ Boyd official military records.

³⁰ Coram, *Boyd*, 225–231.

³¹ *Ibid.*, 233–234; Boyd, "Interview #859," 25–29.

³² Coram, *Boyd*, 239–265.

his association with the A-X program, Boyd got something else from his lightweight fighter work besides an airframe. The fly-off between the YF-16 and YF-17 introduced him to the concept of mismatches in combat due to “fast transient” maneuvers that involved rapid changes in energy states; this concept also influenced Boyd’s future conflict theories.

In April 1972, Boyd finally got his chance to go back to war. He was assigned as vice-commander for Task Force Alpha, based out of Nakhon Phanom air base in Thailand.³³ Task Force Alpha monitored an elaborate sensor system set up to track communist activity along the Ho Chi Minh Trail.³⁴ Always the utilitarian, Boyd implemented changes to make the data

³³ Boyd official military records.

³⁴ The Ho Chi Minh Trail was a logistics supply line used by the North Vietnamese to first supply Viet Cong insurgents, and then its own conventional forces, for operations in South Vietnam. It ran through neighboring Laos and Cambodia, dumping personnel and equipment into South Vietnam at various points. Initially a foot path through the jungle, by the end of the war the Trail was a paved two-lane highway capable of supporting trucks and other large vehicles; see George C. Herring, *America’s Longest War: The United States and Vietnam, 1950–1975*, 5th ed. (New York, NY: McGraw-Hill Education, 2014), 83, 341. The existence of this supply line was a chronic problem facing American forces for the entirety of their presence in Vietnam, and, despite regular bombing raids and eventually ground incursions directed against it, one that was never fully solved.

Boyd’s “Task Force Alpha” was the name of the command that oversaw a series of technologically advanced surveillance programs first embraced by Secretary of Defense Robert S. McNamara in 1966. These programs were intended as a substitute for what McNamara saw as repeated failures to interdict, by conventional military means like bombing, communist infiltration into South Vietnam. The idea was to create a barrier that combined conventional implements like fences and mines with advanced sensors, surveillance aircraft, and computers, to identify infiltrations taking place in real-time and counter them with aviation and artillery assets. The program’s legacy was mixed. On the one hand, verifiable damage was certainly inflicted on Northern Vietnamese forces coming down the trail, and the technology showed promise (Marines specifically cited the value of the sensors in helping interdict communist forces moving against them during the siege at Khe Sanh in 1968). However, even at their best, the sensors could only identify a zone or area to strike, as opposed to a specific target; the lack of direct manned surveillance on the Ho Chi Minh trail made it impossible to accurately verify the quality of strikes directed by information from remote sensors; and the North Vietnamese were well aware that the Trail was under surveillance and frequently developed countermeasures to the electronic sensors.

Boyd’s arrival at Nakhon Phanom in 1972 coincided with the North’s launch of the Easter Offensive, a direct conventional military invasion of South Vietnam. Interdiction of the Ho Chi Minh Trail became more difficult as American aviation was directed north to counter the communist invasion. Communist traffic on the Trail also fell during 1972, as the Easter Offensive was their focus of effort. The histories of Task Force Alpha indicate that the program had petered out by the end of 1972, and given the timeline Boyd may well have helped close the program out entirely.

Boyd’s assignment to Task Force Alpha is covered briefly in Coram, *Boyd*, 268–269. For details on the origin and execution of Task Force Alpha’s mission, see: Maj Philip D. Caine, “Project CHECO Southeast Asia Report: IGLOO WHITE, July 1968–December 1969” (APO San Francisco: Department of the Air Force, Headquarters Pacific Air Forces, 10 January 1970); Bernard C. Nalty, *Air Power and the Fight for Khe Sanh* (Washington, DC: Office of Air Force History, 1986); John T. Correll, “Igloo White,” *Air Force Magazine* (November 2004): 56–61; Nalty, *The War Against Trucks: Aerial Interdiction in Southern Laos 1968–1972* (Washington, DC: Air Force History and Museums Program, 2005).

produced more actionable, including establishing a grid system for sensor emplacement that allowed American pilots to rapidly return fire on communist artillery positions.³⁵

In October, Boyd received command of the base itself; and it was in this billet, interestingly, that Boyd had a rare instance of self-doubt. At the time, Nakhon Phanom experienced many of the problems common to American units in Southeast Asia in the twilight of the Vietnam War: drug abuse, racial tensions, sexual liaisons with the locals, and rampant indiscipline.³⁶ Boyd could not solve these problems with an equation, and previous commanders had a track record of failure. Unlike his predecessors, Boyd served his full year-long tour. His performance reviews commended him for reversing the destructive trends which had stymied previous commanders.³⁷

Yet the command tour at Nakhon Phanom proved the high water mark of Boyd's Air Force career. He returned to the Pentagon in May 1973, as director of Operational Requirements and Development Plans, a "long range planning" department whose unsystematic approach to planning made most of its products meaningless.³⁸ By 1975, Boyd had was tired of pushing for changes that the bureaucracy regularly ignored. In August, he finally retired from active duty as a colonel.³⁹ The Air Force's dream of making him go away finally came true. But for the Army, and more importantly, the Marine Corps, Boyd's influence was only just beginning.

Boyd briefly mentioned "Igloo White," the code-name for the equipment used by Task Force Alpha, in the audio for "Patterns of Conflict;" see John R. Boyd, "Discourse on Winning and Losing," transcript of lecture to USMC Command and Staff College, 25 April, 1989, tape 2, side 1 (8 audio cassettes/8 compact discs), Archives and Special Collections Branch, Library of the Marine Corps, Quantico, VA, 38.

³⁵ Coram, *Boyd*, 269.

³⁶ Coram, *Boyd*, 268–274. The widespread degradation of good order and conduct among American forces deployed to Vietnam at the end of the war is well-documented. See Dr. John Guilmartin, *America in Vietnam: The Fifteen Year War* (New York, NY: Military Press, 1991), 169–173; Herring, *America's Longest War*, 309; Phillip B. Davidson, *Vietnam at War: The History 1946–1975* (New York, NY: Oxford University Press, 1988), 615–619, 631, 661–663; Otto J. Lehrack, *No Shining Armor: The Marines at War in Vietnam* (Lawrence, KS: University Press of Kansas, 1992), 324–329.

³⁷ Coram, *Boyd*, 276.

³⁸ Coram, *Boyd*, 280; Boyd official military records.

³⁹ Coram, *Boyd*, 311–312.

In retirement, Boyd turned his energy from solving engineering problems to the grander theater of fighting and winning wars. Boyd filled his first year with an intense amount of reading and study. Since first publishing the *Aerial Attack Study*, many ideas had slowly accumulated and swirled around in his head.⁴⁰ The *why* behind fighter maneuvers; the rejection of checklist-based rigidity in favor of assessing and deciding based on circumstance; new conceptual frameworks for thinking; mismatches generated by “fast transients;” and the intermix of competition and survival. Boyd had explored all these and more in the pragmatic world of dogfighting and engineering, and believed that something bigger lurked in the shadows of his mind. Boyd read voraciously on subjects from physics to philosophy to history to find material for his framework.⁴¹ Two events already mentioned guided Boyd through the intellectual journey that ultimately coalesced into his capstone presentation called “Patterns of Conflict.” The key events were the flight tests of his YF-16 prototype fighter and his work with Pierre Sprey on the A-10.

The fly-off between Boyd’s YF-16 fighter prototype and the YF-17 in early 1975 triggered Boyd’s conceptual interest in “fast transient” maneuvers and tempo as factors in survival. The test pilots who participated in the fly-off unanimously declared the YF-16 superior in almost all regimes. This contradicted the E-M calculations done on both aircraft, which predicted that the YF-17 should have performed better in certain flight envelopes. After talking to the test pilots, Boyd determined that the discrepancy resulted from thrust-to-weight design characteristics in the YF-16 that allowed it to shed and regain energy far more quickly than the YF-17.⁴² These fast transient maneuvers granted the YF-16 pilots quicker responsiveness and a faster

⁴⁰ Boyd, “Air Force Oral History Interview,” 245.

⁴¹ Coram, *Boyd*, 319; Hammond, *The Mind of War*, 118.

⁴² Franklin C. Spinney, “Genghis John,” *Proceedings* 123, no. 7 (July 1997): 45–46; Coram, *Boyd*, 305–306.

operating tempo, thus repeatedly generating favorable mismatches against the less responsive YF-17. The notion of mismatches contributing to one's success and survival stuck with Boyd, and he revisited it in a study on air-to-air combat he completed for NASA in 1976.⁴³ Boyd was beginning to think about an entirely new conceptual framework through which survival might be viewed.

Boyd's collaboration with associate Pierre Sprey on the development of the A-10 Thunderbolt II close air support (CAS) aircraft sparked his exploration of history. The project was Sprey's, with Sprey consulting Boyd on performance analysis, E-M theory, and views on warfare in general. In designing the A-10, Sprey had to determine what aircraft features provided the firepower and loiter time required by ground forces, while also granting survivability against the enemy ground fire that would inevitably be directed against it. The German Wehrmacht had pioneered both the design and employment of dedicated CAS aircraft in World War II. Thus, Sprey and Boyd interviewed experts on and former members of the Wehrmacht.⁴⁴

From this, the questing mind that had developed the *Aerial Attack Study* and E-M theory again went into action. Sprey had focused on the aircraft and tactics that made German CAS missions successful. Broadening the scope, Boyd examined German tactics and strategy in World War II, and then worked his way back to the time of Sun Tzu as he studied history's most successful military commanders.⁴⁵

To derive the most value from the questions raised by his engineering projects and historical research, Boyd knew that he must first flesh out his conceptual framework. Boyd

⁴³ John R. Boyd, "New Conception for Air-to-Air Combat," 4 August, 1976, box 3, folder 11, Col. John R. Boyd Papers, Personal Papers Collection, Archives and Special Collections Branch, Library of the Marine Corps, Quantico, VA; Frans P. B. Osinga, *Science, Strategy and War: The Strategic Theory of John Boyd* (New York, NY: Routledge, 2007), 26–27; Boyd, "Air Force Oral History Interview," 125–126.

⁴⁴ Hammond, *The Mind of War*, 121; Coram, *Boyd*, 235; Burton, *Pentagon Wars*, 24–25; Osinga, *Science, Strategy and War*, 26.

⁴⁵ Boyd, "Air Force Oral History Interview," 147–149; Hammond, *The Mind of War*, 121–122; Osinga, *Science, Strategy and War*, 26.

wanted a new framework because he believed that the uncritical adoption of older mental models, even of venerable theorists like Carl von Clausewitz, deliberately deprived one of new data that could be useful to one's decisions and actions.⁴⁶ Boyd laid this framework out in a brief but dense essay called "Destruction and Creation," finished in 1976.

Underlying Boyd's discussion in "Destruction and Creation" is the fundamental assumption that all human activity is shaped by the goal of ensuring survival on one's own terms. Survival demands constant and repeated action. An action that supports the goal of survival must be influenced by a proper decision. Such decisions are formed by constructing "mental concepts of observed reality," and changing these concepts when reality is perceived to change. Boyd argued that these mental concepts were derived in two ways: general-to-specific (deductive) and specific-to-general (inductive). The essence of deduction is destructive, as it smashes one or more larger "domains" into smaller constituent elements. Induction is constructive: it finds the commonality among a multitude of free-floating elements and builds them into a new "domain" or concept.⁴⁷

Using these patterns, an observer could thereby change his perception of reality. He would then verify the internal consistency of this new perception, and the degree to which it matched reality. Satisfied that his new concept was internally consistent and corresponded with what he was seeing, the observer would then focus inward to further refine the concept and merge it with reality. Here, Boyd argued, lay the potential for a dangerous divergence. This self-satisfaction tended to block out any "alternative ideas and interactions" that might "expand, complete, or modify the concept." The mental block created by this inward refinement meant

⁴⁶ Boyd, "Discourse on Winning and Losing" lecture/transcript, tape 1, side 1, 3; tape 1, side 2, 27–28; tape 4, side 1, 114–115.

⁴⁷ John R. Boyd, "Destruction and Creation," in *A Discourse on Winning and Losing* (unpublished manuscript, 1987), 1–3.

that a “mismatch” was created between “new observations and the anticipated concept description of these observations.”⁴⁸ Obviously a discrepancy between actual reality and perceived reality was detrimental to taking actions necessary to ensure one’s own survival.

To prove this decision-making concept, Boyd merged three concepts from the realms of mathematics and physics. The first came from Kurt Gödel’s proof that the consistency of a system cannot be proved from within the system; one needed another system beyond it to do so. Boyd adapted the second concept from Werner Heisenberg’s Uncertainty Principle, which held that the very presence of an observer introduced an element of uncertainty into the system being observed. The final concept came from the Second Law of Thermodynamics: that all observed processes create entropy, a “low capacity for taking action or a high degree of confusion and disorder.”⁴⁹ Entropy increased within closed systems. This made it impossible to determine the system’s consistency from within itself as it was always moving toward a higher state of confusion and disorder.

How did Boyd relate all of this to his decision-making concept? Per Gödel, one cannot determine the true nature of a system from within itself. Heisenberg and the Second Law of Thermodynamics showed that any inward-directed attempt to do so only increased the uncertainty and disorder of that system, pushing it farther away from the true nature of the reality observed. Thus, once an individual made a decision and chose an action, clinging to this decision

⁴⁸ Ibid., 4–8.

⁴⁹ Ibid., 8–13. For more on Gödel’s proof, see Ernest Nagel and James R. Newman, *Gödel’s Proof*, rev. ed., ed. Douglas R. Hofstadter (New York, NY: New York University Press, 2001). An early incarnation of the Uncertainty Principle appeared in a 1927 paper by Heisenberg, a German physicist who was working at Niels Bohr’s institute in Copenhagen at the time, entitled “On the Perceptual Content of Quantum Theoretical Kinematics and Mechanics.” It is unclear when Boyd first came across the ideas of Gödel and Heisenberg; they may have comprised part of his intensive reading program following his retirement from the Air Force. In his earliest oral history, Boyd mentioned taking thermodynamics during his last two academic quarters while enrolled at Georgia Tech as part of the AFIT program and said he “had a good feel for the subject” (Boyd, “Interview #859,” 2–3). This was likely the first time he studied the subject in-depth, though as his high school transcript indicates a course in physics, he was probably introduced to it as a teenager (Boyd official military records).

and attempting to refine it without any additional external input would, over time, make that decision less and less suited to reality. That action would be less conducive to survival and therefore potentially self-destructive. The solution to this dilemma went back to his initial *destructive deduction* and *creative induction* concept. The observer could never be satisfied that his most recent observation of reality was, in fact, final. He had to break it down again and again, using both the broken pieces from within the system and new observations outside of it to build an even newer perception.⁵⁰ This never-ending decision-making process was the only way to ensure that an individual made survival choices with the most accurate perception of reality possible.

In “Destruction and Creation,” Boyd finally had the mental framework required to wrestle with the other ideas that had danced about his mind for years. Now he could lay out the history of war and national survival over the framework of “Destruction and Creation;” this became the presentation “Patterns of Conflict.” As an engineer, Boyd knew that proving his mental framework in the historical context of “Patterns of Conflict” required running tests and collecting evidence. But his study of history told him “that those tests have been run;” the evidence had already been collected in millennia’s worth of recorded history.⁵¹ It simply required examination in the context of his new concept.

Boyd reviewed the historical evidence and found the results startling. His work with the A-10 had already familiarized him with the German blitzkrieg; he now returned to it through the lens of his concept. Boyd read that the French army facing the blitzkrieg became “uncertain, confused, disordered;” in other words, precisely the result of succumbing to the dangerous

⁵⁰ Boyd, “Destruction and Creation,” 13–15.

⁵¹ Boyd, “Air Force Oral History Interview,” 127.

divergence of perception he noted in “Destruction and Creation.”⁵² Conversely, the Germans operated smoothly and rhythmically, pushing the French where the pressure would most likely cause them to collapse. The Germans understood the framework; the French did not. Boyd then looked at his earlier question on the disparity between F-86 and MiG-15 performance, and other modern examples, and saw the same evidence of confusion and disorder exhibited by one side.⁵³

The farther back Boyd traveled through the annals of history, the more he found “a whole body of evidence that supports this idea that I am talking about, of getting inside the other guy’s observation-decision-action time scales.”⁵⁴ But nobody had examined this evidence the way Boyd did, in the context of the lessons gleaned from “Destruction and Creation.” Boyd applied

⁵² Ibid., 140. Unfortunately Boyd does not give the title or author of this, “the very first history book I picked up,” on the German conquest of France in World War II. However, at the time of Boyd’s oral history interview there existed an extensive historiography on the subject. John Cairns provided an extensive survey of the works extant only a few years prior to Boyd’s interview; see John C. Cairns, “Some Recent Historians and the ‘Strange Defeat’ of 1940,” *Journal of Modern History* 46, no. 1 (March 1974): 60–85.

The most recent detailed analysis is by Julian Jackson, and among other things he explains the weaknesses characteristic of the historiography available in Boyd’s time. Yet Jackson provides support for the mental shock inflicted on the French which so impressed Boyd, and which has been a staple of explanations for the rapid collapse of the French Army in 1940. Jackson quotes French soldiers who acknowledge that they “had lost the operational initiative;” they never recovered it, and so “felt we were moving in a kind of fog.” French surprise at the unexpected locations of the Wehrmacht’s thrusts—bypassing French fortifications along the Maginot Line, sending armor through the supposedly impassable Ardennes forest—was compounded by mental unpreparedness for the style of war the Germans used. French doctrine focused on “methodical warfare,” using a highly centralized command structure to maintain sufficient control over what had become, by 1940, an amateur army of conscripts and reservists leavened only by a small cadre of professional soldiers. This meant that the officers charged with making key decisions were behind the front in static command posts, awaiting enough information about the big picture to properly maneuver their inexperienced troops. This stood in stark contrast to German doctrine, whereby senior leaders were regularly at the front, empowered to take the initiative and make key decisions on their own without seeking permission from high up the chain of command. French leaders also had not absorbed the implications of improvements in mobility since World War I; they believed that the initial German advances, rapid though they were, would soon bog down due to fatigue and logistical problems, affording the French enough time to react. Overall, this methodical mindset was badly shaken when the invading Wehrmacht refused to act with equal deliberateness, and as the Germans kept the pressure on, the French never recovered. This was summed up in the description of one French general’s reaction: “he gave... the impression of a man whose brain had ceased to function ... the blows that had fallen on us in quick succession had left him ‘punch drunk’ and unable to register events.” See Julian Jackson, *The Fall of France: The Nazi Invasion of 1940* (New York, NY: Oxford University Press, 2003), 219–227.

⁵³ Boyd, “Air Force Oral History Interview, 142–144; Spinney, “Genghis John,” 46; a detailed history of the Entebbe raid can be found in Saul David, *Operation Thunderbolt: Flight 139 and the Raid on Entebbe Airport* (New York, NY: Little, Brown and Company, 2015).

⁵⁴ Boyd, “Air Force Oral History Interview,” 144.

these lessons and concluded that they “suggest[ed] a new conception...for waging war.” Here was the core of Boyd’s new conception:

generate a rapidly changing environment, quick clear observations, fast tempo ... or you can turn it around the other way, to inhibit an adversary’s capacity to adapt to such environment [sic]... suppress or distort his observation by suppressing or distorting your signatures . . . Always try to remain somewhat inconspicuous, at least more inconspicuous than he is ... unstructure [sic] your adversary’s system into a hodge-podge of confusion and disorder [thus] causing him to... under- or overreact to your activity, which appears uncertain, ambiguous, and chaotic to him.⁵⁵

With his mental framework and historical study, Boyd now had a *how* for thinking about war.

Boyd laid out his synthesis of the conceptual and the historical in a slide-based lecture, which became the avenue by which he spread his influence throughout the Army and Marine Corps.⁵⁶ From 1976 onward, he delivered this brief hundreds of times and repeatedly revised it until just before his death.⁵⁷

⁵⁵ Ibid., 145–146.

⁵⁶ Fideleon Damian, “The Road to FMFM 1: The United States Marine Corps and Maneuver Warfare Doctrine, 1979–1989” (Master’s thesis, Kansas State University, 2008), 35. Proponents of an amorphous “maneuver” concept existed before Boyd’s ideas became widely known. Yet as Damian points out here, and as will be discussed later, when maneuverists sought details to flesh out their concept, they went to Boyd and “Patterns.”

⁵⁷ Coram, *Boyd*, 384, 431. This is no exaggeration. The sheer quantity of briefings Boyd delivered is remarkable. He presented them often and to a wide variety of audiences. His monthly planners from 1980 to 1984 tell the story: he delivered “Patterns of Conflict” 37 times in 1980 and 54 times in 1981. After 1982, he shifted to briefing “Organic Design for Command and Control” more often, or combined it with “Patterns.” In 1982, he briefed one or both 62 times, 54 times in 1983, and 25 in 1984. This was in addition to a very robust speaking and meeting schedule each year. See box 22, Col. John R. Boyd Papers, Personal Papers Collection, Archives and Special Collections Branch, Library of the Marine Corps, Quantico, VA

While Boyd presented his briefs in the “pre-digital” age, there are still resources available for those seeking a taste what it was like to “be there.” Dan Grazier has done a great service by posting a series of video clips on YouTube from an undated presentation of “Patterns of Conflict” to an apparently civilian audience (Dan Grazier, “Disruptive Enterprises,” *YouTube*, last accessed 27 February, 2017, <https://www.youtube.com/user/DisruptiveEnterprise/videos>). Grazier has integrated digital versions of Boyd’s slides with the video clips, as the actual slides are not readable due to poor video quality. Additionally, the Library of the Marine Corps holds a complete audio recording of a brief presented to a primarily Marine Corps audience in 1989 (see citation in chapter 1). This author completed a written transcript of the 1989 audio recording with slide annotations to partially remedy the complaint that “Boyd never wrote anything down” and aid in following the audio, which is of generally poor quality. This transcript is also available from the Marine Corps Archives.

In “Patterns of Conflict,” Boyd viewed warfare as a struggle for survival writ large. He surveyed historical examples wherein the concept of “Destruction and Creation” was successfully used. From these examples, one could “make manifest the nature of the Moral-Mental-Physical Conflict; ...discern a Pattern for Successful Operations; ...help generalize Tactics and Strategy; ...find a basis for Grand Strategy,” and ultimately “unveil the character of conflict, survival, and conquest.”⁵⁸ Because war was the greatest survival struggle of all, it required decisions and actions from both the individual and the group. As stated above, Boyd saw history as the laboratory for his ideas, and wars and battles as his test data. In this way, he took his audience through many historical examples of war and different methods for making decisions and taking action.⁵⁹

Noting that the blitzkrieg/guerrilla style of war appeared to be the most successful throughout history, he outlined some common characteristics.⁶⁰ These characteristics aligned with Boyd’s “new conception” derived from “Destruction and Creation” in attacking what he saw as the key to survival—the mental framework for perception and decision-making—and not unnecessarily wasting energy, lives, and materiel attacking the opponent physically, in the blind pursuit of conventional battle. The friendly force would repeatedly use ambiguity, mobility, and violence to generate surprise and shock. It mopped up the enemy fragments isolated by shock and lack of cohesion. By the end, an adversary would be paralyzed and collapse. Boyd used these lessons as building blocks for the next segment of the brief, which elaborated on this style of war and gave it a name.⁶¹

⁵⁸ Boyd, “Patterns of Conflict,” 2.

⁵⁹ Ibid., 10–97.

⁶⁰ Ibid., 98.

⁶¹ Ibid., 101.

Boyd called this style “maneuver conflict.” In maneuver conflict, one generated ambiguity, deception, novelty, fast transient maneuvers, and focused thrusts to severely degrade an adversary’s ability to act coherently. The aim of maneuver conflict was to “generate many non-cooperative centers of gravity, as well as disorient, disrupt, or overload those that the adversary depends upon, in order to magnify friction, shatter cohesion, produce paralysis, and bring about his collapse; or equivalently, uncover, create, and exploit many vulnerabilities and weaknesses, hence many opportunities, to pull adversary apart and isolate remnants for mop-up or absorption.”⁶² The efficacy of maneuver conflict was borne out in the laboratory of history, tied to long strings of blitzkrieg and guerrilla victories.⁶³

These ideas apparently required an unnatural degree of prescience and internal cohesion. To operate in this amorphous manner, one’s own force had to quickly identify key enemy vulnerabilities, rapidly exploit them, and break apart enemy cohesion without discombobulating its own soldiers in the process. German military tradition had a label for the key enabler of this style of war: *fingerspitzengefühl*, literally “finger-tip feeling.”⁶⁴ This was an intuitive ability to look at a given situation, immediately grasp the essentials, and rapidly act. A few rare individuals enjoyed *fingerspitzengefühl* as a natural gift. Yet it could be developed in most people by giving them repeated hands-on experience under a variety of conditions in order to build a repertoire of responses and, just as importantly, inculcate decision-making and action as a habit.

Boyd’s “wrap up” tied the threads of “Destruction and Creation” and “Patterns of Conflict” together. In war, the “game” was to generate multiple efforts and mismatches against

⁶² Ibid., 117.

⁶³ Ibid., 84, 89, 97. While it could be argued that Boyd’s lists were highly selective in their 20th century focus, Boyd also showed in slide 84 that blitzkrieg was the really the conceptual culmination of trends going back millennia, which he had already covered in the first half of his presentation.

⁶⁴ Boyd, “Discourse on Winning and Losing” lecture/transcript, tape 1, side 1, 15.

the moral and mental bonds that allowed the enemy to act as a cohesive whole. Severing or degrading those bonds would reduce an enemy to discordant, non-cooperative elements, induce paralysis, and “collapse his will to resist. One accomplished this by getting “inside [the] adversary observation-orientation-decision-action loops (at all levels) by being more subtle, more indistinct, more irregular, and quicker—yet appear to be otherwise.”⁶⁵ Here again was the “new conception,” the culminated strands of Boyd’s theories. In “Destruction and Creation,” Boyd warned of the danger inherent in a mismatch between perception and reality. In war, the goal was to create precisely such a mismatch for the enemy. One had to prevent the enemy from gleaning the benefit of the continuous destructive/creative decision-making cycle. The adversary’s focus had to be kept inward on a deteriorating observed system that was increasingly disconnected from actual reality. His decisions and actions would be less and less useful to his own survival, until his entire system finally collapsed and he was rendered incapable of any decision or activity.⁶⁶

Boyd often referred to what he called the observation-orientation-decision-action (or OODA) loop throughout “Patterns of Conflict.” The loop deserves some explanation, for while it remains the most well-known of Boyd’s ideas, it is also one of the most misrepresented. Boyd himself was clear that the loop’s genesis “came from work and anomalies associated with [the] evolution and flight tests of [the] YF 16/17.”⁶⁷ The tests drove Boyd to explore the concept of mismatches contributing to one’s success and survival; and the relationship between agility, tempo, and how one could exploit them to make an adversary’s perceived reality diverge from “real”

⁶⁵ Boyd, “Patterns of Conflict,” 175.

⁶⁶ *Ibid.*, 141.

⁶⁷ Roger Spiller, “Critique of John Boyd’s ‘Patterns of Conflict,’” undated, folder 9, box 5, Col John R. Boyd Papers.

reality. Boyd broke the process down into the loop which he referenced (though did not visually depict) in his briefings. The OODA loop is commonly depicted as seen in Figure 2:⁶⁸

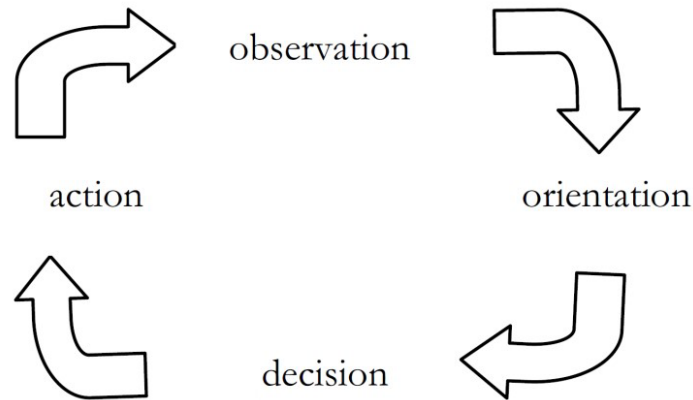


Figure 2.

The simple four-step decision-making process begins with observation: sensing one’s self and the world around him.⁶⁹ Orientation follows, and is the application of many filters, such as culture, knowledge, and personal experience, to the initial observation.⁷⁰ Next, potential actions are considered and the observer chooses one. Finally, there is action, or the application of that decision. Seeing the results of that action, the observer then begins the whole process over again.

The problem with this depiction is that it actually shows precisely the type of closed system Boyd warned against in “Destruction and Creation.” Both Boyd’s critics and proponents, however, mistook this oversimplification for the full nature of the “Boyd cycle.” Many critics argued that the OODA loop was simplistic and flawed. Those critics might have been right, were that all there was to the loop. Yet that was not the case. Though he often spoke about it, Boyd had not offered a

⁶⁸ Osinga, *Science, Strategy and War*, 2.

⁶⁹ *Ibid.*, 230.

⁷⁰ *Ibid.*, 230–232.

graphical depiction of the OODA until two years before his death. When he finally did (Figure 3), it was a far richer concept than its four steps belied.⁷¹

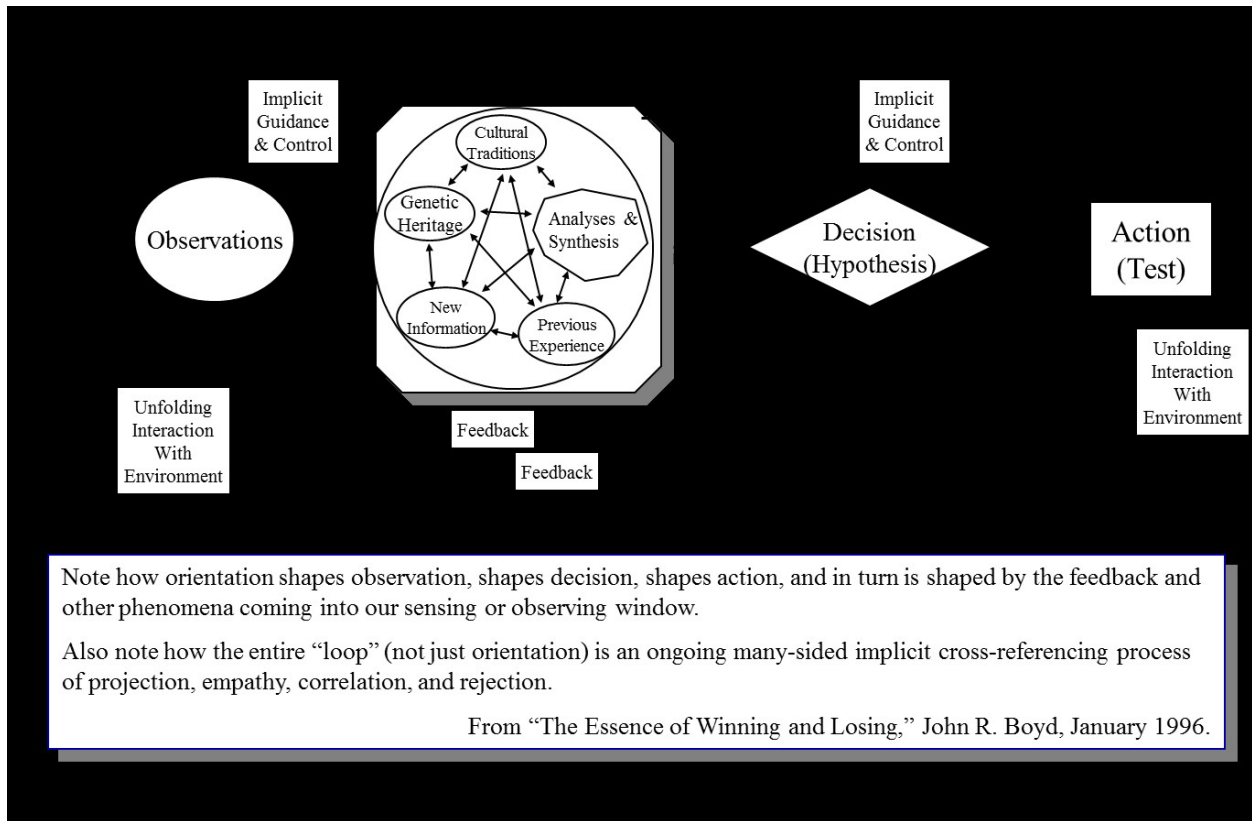


Figure 3.

Here, the loop is not a closed, one-way cycle of seeing, deciding, and doing. It is “an ongoing many-sided implicit cross-referencing process of projection, correlation, and rejection.”⁷² While observation is the first step, orientation is the most important; it “shapes observation, shapes decision, shapes action, and in turn is shaped by the feedback and other phenomena coming into our sensing or observing window.”⁷³ Orientation was where the exhaustive process of cultivating

⁷¹ Osinga, *Science, Strategy, and War*, 231.

⁷² *Ibid.*, 232.

⁷³ *Ibid.*, 230.

fingerspitzengefühl, trust, adaptability, flexibility, initiative, and cohesion on the friendly side, and analyzing those factors on the adversary's side, paid its real dividends.

Boyd never argued that the key to maneuver warfare and the OODA loop was cycling through it at a faster absolute speed than one's opponent. As he put it, "maneuver warfare is just not a bunch of guys going down the highway at a high speed."⁷⁴ Relative tempo, not time, was the key factor. To remain unpredictable, one's own timing had to vary to prevent an adversary from recognizing a pattern.⁷⁵ Tempo could include deliberately slowing down one's own activities, or injecting friction into an adversary's system to slow him down without necessarily speeding up one's self. This was almost equivalent to choosing between football's no-huddle offense or running out the clock. Furthermore, time and tempo were only two of many factors used against an opponent to render him incapable of activity; one still sought to isolate and neuter physical and non-physical strengths and moral bonds simultaneously.⁷⁶ All of this was examined during the critical "orientation" phase, and was applicable from the grand strategic down to the tactical level.

With each revision to "Patterns of Conflict," Boyd's audience widened, expanding beyond his close friends at the Pentagon to include many senior military leaders within the Army and Marine Corps. Both institutions, embittered by the frustrations and failures of Vietnam, sought ways to more effectively fight future wars. This search included a reassessment of each Service's combat doctrine, with reformers understanding that the geopolitical landscape following America's withdrawal from Vietnam was quite different from that prior to America's entry there. The Soviet Union reemerged as the preeminent threat on the horizon. The Yom Kippur War of 1973—with the military posture of Israeli and Arab echoing that of NATO and the Warsaw Pact along the German

⁷⁴ Ibid., tape 4, side 2, 134.

⁷⁵ Osinga, *Science, Strategy, and War*, 235–236.

⁷⁶ Ibid., 236.

border—gave further impetus to calls for new ways of thinking.⁷⁷ Reform-minded leaders in the ground-focused Services found, in their own ways, that Boyd’s ideas could help them tackle the problems raised by the post-Vietnam landscape.

Boyd’s influence on United States Army doctrine was less direct than his ultimate impact on Marine Corps doctrine. He briefed Gen. Donn Starry, then head of the Army’s Training and Doctrine Command, in February, 1981; Lt. Col. Huba Wass de Czege, selected by Starry to revise the Army’s own capstone doctrine, got a brief from Boyd in November, 1982. Additionally, from 1980–1983, he presented his briefs to the Army War College, Army Command and General Staff College, and United States Military Academy.

Thus Boyd certainly interacted with the Army; the question is what degree, if any, Boyd’s ideas influenced the Army’s development of “AirLand Battle” doctrine. Boyd intimate James Burton accused the Army of directly copying Boyd’s work without attribution. Yet, while it is true that some Army reformers heard Boyd’s brief, and that Boyd briefed at Army schools as part of his yearly speaking schedule, the linkages between Boyd and AirLand Battle doctrine are murkier. Maj. Todd Larsen analyzed the literature on the subject and concluded that Boyd’s briefings to Army officers were under the rubric of a larger reform dialogue already underway within that Service. While other historiography offers tantalizing potential evidence of Boyd’s influence—such as the sudden introduction of German concepts like *schwerpunkt* (“center of gravity”) into AirLand Battle’s language, or an evolutionary sketch of maneuver warfare that virtually mirrors the historical synthesis in the first part of “Patterns of Conflict”—Boyd was not involved in the development of AirLand Battle to the same extent he influenced *Warfighting*. Moreover, there were far fewer Army officers who acknowledged Boyd as an influence, and the

⁷⁷ Saul Bronfeld, “Fighting Outnumbered: The Impact of the Yom Kippur War on the U.S. Army,” *The Journal of Military History* 71 (April 2007): 473–474.

institutional Army never made a public claim on Boyd's contribution, as the Marine Corps did, after Boyd's death. Nonetheless, Boyd's engagement of officers across the Services were further examples of his own desire to flesh out his ideas by sharpening them against the minds of as many people as possible, and his free willingness to share his thoughts with any interested stakeholders.⁷⁸

At best, Boyd was a silent partner in the Army's doctrinal reform. When the Marine Corps endured its own post-Vietnam soul-searching, Boyd's influence was loud and public, both on his own and through the efforts of several enthusiastic surrogates. Boyd delivered "Patterns of Conflict" far more often to Marine Corps audiences, and it resonated deeply with four very different individuals who, in 1989, nevertheless came together to turn Boyd's ideas into the Corps' central combat philosophy. These four men were William S. Lind, Col. Michael Wyly, Gen. Al Gray, and Capt. John Schmitt.

William Lind was a long-time congressional staffer with a background in history, working first for Senator Robert Taft Jr., in 1973, and later moving to Senator Gary Hart's staff. On both, Lind aggressively pushed for widespread reform within the Department of Defense.⁷⁹ He developed a reputation for directing withering criticism at both individuals and institutions insufficiently enthusiastic about reform.⁸⁰ This criticism did not endear him to many within the

⁷⁸ Burton, *Pentagon Wars*, 51–54; U.S. Army, *Field Manual (FM) 100-5, Operations* (Washington, DC: Headquarters, Department of the Army, 1986); Maj. Todd M. Larsen, *John Boyd and the AirLand Battle Doctrine* (Fort Leavenworth, KS: United States Army Command and General Staff College, 2012); John L. Romjue, *From Active Defense to AirLand Battle: The Development of Army Doctrine 1973-1982*, TRADOC Historical Monograph Series (Fort Monroe, VA: Historical Office, U.S. Army Training and Doctrine Command, 1984); Douglas W. Skinner, *AirLand Battle Doctrine* (Alexandria, VA: Center for Naval Analyses, 1988); Robert Leonhard, *The Art of Maneuver: Maneuver-Warfare Theory and AirLand Battle* (Novato, CA: Presidio Press, 1991).

⁷⁹ Anthony John Piscitelli, "The United States Marine Corps Way of War" (PhD thesis, University of Glasgow, 2014), 24; Gary Hart and William S. Lind, "Detailed Outline: Military Reform," folder "Bill Lind's Visit to the Naval War College," 1, box 22, Alfred M. Gray II Papers.

⁸⁰ For example, see William S. Lind and Jeffrey Record, "The Marines' Brass Is Winning Its Battle But Losing the Corps," *Washington Post* (28 July, 1985), B1–B2; Coram, *Boyd*, 383.

Corps' senior leadership, but it found an eager audience in the lower ranks who believed that the Corps had to do better than its performance in Vietnam. In 1977, Lind first met Boyd and sat through the "Patterns of Conflict" brief.⁸¹ Boyd's ideas, with their historical grounding, appealed to Lind's own historical sensibilities, and Lind quickly became Boyd's loudest promoter. A few years later, Lind was introduced to then-Maj. Gen. Alfred M. Gray, commanding general of the 2nd Marine Division, who was himself a reformer. Gray adopted and disseminated many of Lind's *Marine Corps Gazette* articles—themselves permeated with Boyd's ideas—and Lind soon became a regular contributor to Gray's own efforts to indoctrinate the 2nd Marine Division in maneuver warfare practices.⁸²

Lind also connected Boyd to Michael Wyly, a Marine Corps officer with extensive combat experience in Vietnam.⁸³ Wyly, having already experimented with his own tactics in Vietnam to counter communist ingenuity, came back from the war with determined to find new ways of winning that husbanded Marine lives.⁸⁴ This determination hardened after he held a series of instructor billets at different Marine Corps schools, where he regularly found outdated curricula feeding students obsolete tactics with little regard for the lessons learned from the last several decades of warfare in which the Marine Corps had been involved.⁸⁵ In 1979, while assigned to Amphibious Warfare School (AWS), Wyly was introduced to William Lind, whose reformist tendencies were very much in line with his own. Wyly agreed that he and Lind were opposed to the

⁸¹ Hart and Lind, "Detailed Outline: Military Reform," 1.

⁸² "Maneuver Warfare Board at Lejeune," *Marine Corps Gazette* 65, no. 10 (October 1981): 6; John F. Schmitt, interview by LtCol Sean Callahan, 21 February, 2013, transcript, Oral and Video History Section, History Division, Marine Corps University, Quantico, VA.

⁸³ "Mike Wyly," *Boyd for Business and Innovation Conference*, last accessed 15 March, 2017, <http://boydbusinessinnovationconference.com/mike-wyly/>; Michael Wyly, phone interview with author, May 12, 2017.

⁸⁴ Piscitelli, "The United States Marine Corps Way of War," 218.

⁸⁵ Col Michael Wyly, interview with Linda Magleby, 3 July, 1991, transcript, Oral and Video History Section, History Division, Marine Corps University, Quantico, VA; Wyly phone interview.

same ossified institutional thinking, but he wanted to offer something positive as a replacement. Lind told Wyly that a man named John Boyd might have the very concept. It was called maneuver warfare, and Boyd explained it in a briefing named “Patterns of Conflict.” Wyly contacted Boyd, who became a regular lecturer at AWS during Wyly’s tenure there; and Wyly even arranged for one of the only publication efforts of Boyd’s works.⁸⁶

Al Gray was a believer in maneuver warfare even before the term was officially coined. His decades of combat experience had already led him to embrace the concepts of flexible thinkers like Sun Tzu, and he applied them both while fighting insurgents in Vietnam, and participating in NATO exercises across the plains of Europe.⁸⁷ Boyd was briefing “Patterns of Conflict” to an ever-wider audience shortly before Gray took command of the 2nd Marine Division, and Gray became one of the few individuals willing to sit through Boyd’s hours-long extravaganza multiple times.⁸⁸ Once in command of the 2nd Marine Division, Gray invited Boyd to deliver “Patterns of Conflict” to his Marines, and Boyd’s concepts became official parts of the Division’s doctrine and public relations efforts.⁸⁹ By 1989, Gray was Commandant of the Marine Corps and determined to make maneuver warfare the Corps’ official combat doctrine. Capt. John Schmitt would help Gray achieve that goal.

⁸⁶ Coram, *Boyd*, 378, 381; Wyly phone interview.

⁸⁷ Gen Al Gray, LtGen Paul K. Van Riper, and Maj John F. Schmitt, interview by Twayne Hickman, February 24, 2015, “Warfighting Discussion Panel with Gen Alfred M. Gray, LtGen Paul K Van Riper, and Maj John F. Schmitt,” MAGTF Instruction Group, Marine Corps University, Quantico, VA; Piscitelli, “The United States Marine Corps Way of War,” 38; Col Gerald H. Turley, *The Journey of a Warrior* (Bloomington, IN: iUniverse, 2012), 17–19.

⁸⁸ Burton, *Pentagon Wars*, 48. See also box 22, Col. John R. Boyd Papers; Boyd’s 1980 Monthly Date Keeper shows one briefing he gave to Gen. Gray on 28 November, 1980. Boyd briefed him again on 11–12 January, 1982.

⁸⁹ Coram, *Boyd*, 382–383; “2d MarDiv Maneuver Warfare Study,” *Marine Corps Gazette* 66, no. 3 (March 1982): 8; “Introduction—2D MARDIV Maneuver Warfare SOP,” folder 9, box 3, Robert Coram Papers; “Talking Paper for use by MGen A. M. Gray,” folder “Sep 1983—2D MARDIV Maneuver Warfare Readings,” box 39, Alfred M. Gray II Papers.

Capt. Schmitt joined the Marine Corps in the early 1980s, and by happy chance his first assignment was to Gen. Gray's 2nd Marine Division.⁹⁰ There, Schmitt had a front-row seat for Gray's maneuver warfare reforms, as well as his first interaction with Lind and thus, indirectly, Boyd's ideas.⁹¹ Schmitt embraced maneuver warfare whole-heartedly. He tried to practice his zeal during his next assignment at the Doctrine Center in Quantico, Virginia; but his attempts to inject maneuver warfare doctrine into a draft ground operations manual were rebuffed by his superiors. Gen. Gray's appointment as commandant gave Schmitt's superiors a change of heart, however, and knowing Gray's fondness for maneuver warfare, they gave Schmitt last-minute approval to include it in the manual.⁹² This effort turned into a dry run for a much more ambitious project that Schmitt received directly from Gray in 1988: to write the new capstone *Fleet Marine Force Manual-1*, from which all other Marine Corps doctrine would derive. Gray gave Schmitt one hard rule for writing the book: "You have to satisfy me and nobody else. You don't answer to anybody except for me. If anybody tries to unduly influence what you're saying or you're writing, you tell me about it and I'll take care of it."⁹³ Schmitt was free to talk to whomever he wanted and use the ideas of whichever theorists he desired. As a result, the name of John Boyd suddenly found itself in the august company of Carl von Clausewitz and Sun Tzu. Both Schmitt and those with whom he consulted—Michael Wyly, William Lind, and others—made it clear that Boyd's thought was a key ingredient in the final product.⁹⁴ After five months

⁹⁰ Gray et al., interview with Twayne Hickman.

⁹¹ Schmitt, interview by LtCol Sean Callahan.

⁹² Ibid.; see also "Fundamentals of Maneuver Warfare: Extracts from *OH-6*," *Marine Corps Gazette* 72, no. 4 (April 1988): 50. This short article highlighted the maneuver warfare portion of *Operational Handbook (OH) 6-1, Ground Combat Operations*. The emphasis on the mental dimension of war, and seeking to unravel an adversary, relate back to the details of "Patterns of Conflict." The goal of seeking more rapid decision-making clearly draws from the OODA loop.

⁹³ Schmitt, interview by LtCol Sean Callahan.

⁹⁴ Ibid.; Maj John F. Schmitt, "FMFM-1 Warfighting Discussion" (lecture, Expeditionary Warfare School, Marine Corps University, Quantico, VA, n.d., ca. 1996); LtGen Paul K. Van Riper (Ret.), interview by LtCol Sean P. Callahan, 12 May, 2014. In his lecture ca. 1996 at EWS, Schmitt said that he drew from the body of maneuver

of drafting, Schmitt produced a short but eminently readable work. Boyd was cited several times, with his ideas also lingering under the surface of many other paragraphs.⁹⁵ Gray signed off on Schmitt's draft virtually unchanged; and thus *Warfighting*, encapsulating Boyd's ideas on conflict, gave the Corps its long-sought way of staying useful against the multitudinous threats of the modern world. Since its birth, *Warfighting* has only been revised once, in 1997 under Gen. Charles Krulak. And in this case, Boyd's involvement was even more direct, as he commented directly upon Schmitt's draft revisions and was ultimately attributed with three-quarters of the manual's changes.⁹⁶ Sadly, this marked the last time Boyd influenced the Marine Corps in person. Boyd died on 9 March 1997, four months before the publication of the newly-revised *Warfighting*.⁹⁷

The Marine Corps spared no effort to publically acknowledge Boyd's impact on their institution. Within days of Boyd's death, Gen. Krulak contacted his family to preserve his papers, all of which now reside in the Gray Research Center in Quantico.⁹⁸ Krulak also penned a remarkable tribute to Boyd, stating that Boyd "was an architect of [the Desert Storm] victory as surely as if he'd commanded a fighter wing or a maneuver division in the desert." Krulak concluded: "I, and his Corps of Marines, will miss our counselor terribly."⁹⁹ The Corps can pay no higher compliment than claiming a man as one of its own. Nor have the Marines turned their back on Boyd in the intervening years. While maneuver warfare doctrine has been challenged many

warfare literature written up to that point, as well as works on and by many of the great battlefield commanders of history.

⁹⁵ "FMFM-1 Warfighting," in *Warfighting: Maneuver Warfare in the U.S. Marine Corps*, ed. LtCol H. T. Hayden (London, England: Greenhill Books, 1995), 40-41, 48, 50-51, 56-57, 63-64, 69, 72, 76. See also Hammond, *The Mind of War*, 195-196. Hammond identifies several passages where Boyd is not specifically cited but the ideas in "Patterns of Conflict" are clearly reflected.

⁹⁶ Schmitt, "FMFM-1 Warfighting Discussion;" Schmitt, interview by LtCol Sean Callahan.

⁹⁷ Hammond, *The Mind of War*, 2.

⁹⁸ *Ibid.*, 205. The repository itself may be found in Col. John R. Boyd Papers, Personal Papers Collection, Archives and Special Collections Branch, Library of the Marines Corps, Quantico, VA.

⁹⁹ *Ibid.*, 3-4.

times, both in theory and in practice, it—undergirded by the unconventional notions of an Air Force fighter pilot—remains the lodestar by which the Marine Corps strives to fight its wars.

Boyd had a remarkable impact on the Marine Corps, and his ideas are enjoying a modern resurgence. After years spent applying his theories to ground warfare, recent analyses have returned to Boyd's roots in air power.¹⁰⁰ Others have reevaluated and applied Boyd's extensive but oft-unremarked commentary on guerrilla warfare to contemporary American counterinsurgency operations in Iraq and Afghanistan.¹⁰¹ The rise of new state competitors and adversaries, such as China, Russia, Iran, and the Islamic State, has highlighted how other nations are successfully employing Boyd's concepts against the United States.¹⁰² In a time remarkably similar to the post-Vietnam era that first spawned it, today's Marine thinkers are returning to the realm of ideas and reevaluating maneuver warfare's application.¹⁰³ The *Marine Corps Gazette*, always a mirror for the Corps' contemporary thinking, has seen an uptick in recent years of articles reexamining Boyd, maneuver warfare, and the extent to which the Corps has successfully implemented those concepts.¹⁰⁴ And the Corps itself appears to be undergoing a "reawakening" to the importance of

¹⁰⁰ Maj David S. Fadok, "John Boyd and John Warden: Air Power's Quest for Strategic Paralysis" (Master's thesis, Air University Press, 1995); John Olsen, ed., *Airpower Reborn: The Strategic Concepts of John Warden and John Boyd* (Annapolis, MD: Naval Institute Press, 2015); Steven Mason, "John Boyd and Strategic Naval Air Power," *Proceedings* 129, no. 7 (July 2003): 76–78.

¹⁰¹ Daniel Ford, *A Vision So Noble: John Boyd, the OODA Loop, and America's War on Terror* (Durham, NH: Warbird Books, 2010).

¹⁰² "John Boyd's Revenge: How ISIS got inside our OODA loop," B. A. Friedman, *The Bridge*, last modified June 1, 2015, accessed January 6, 2016, <https://medium.com/the-bridge/john-boyd-s-revenge-8a57d9a53364#.22gw8tywa>.

¹⁰³ Maj Paul Tremblay Jr., "Shaping and Adapting: Unlocking the Power of Colonel John Boyd's OODA Loop" (Master's thesis, United States Marine Corps Command and Staff College, 2015).

¹⁰⁴ Capt Brett A. Friedman, "Institutional Innovation," *Marine Corps Gazette* 98, no. 1 (January 2014): 82–85; Capt Daniel A. O'Hara, "The Re(al)awakening," *Marine Corps Gazette* 98, no. 5 (May 2014): 47–50; Capt Brett A. Friedman, "Maneuver Warfare: A defense," *Marine Corps Gazette* 98, no. 12 (December 2014): 26–29; Capt Daniel R. Grazier and William S. Lind, "Maneuver Warfare," *Marine Corps Gazette* 99, no. 4 (April 2015): 24–27; Maj Ian T. Brown, "Opening the Loop," *Marine Corps Gazette* 99, no. 6 (June 2015): 52–56; Capt Daniel R. Grazier, "A Manoeuvre Renaissance," *Marine Corps Gazette* 99, no. 6 (June 2015): 57–60; Capt Jason Topshe, "Evolving the Marine Corps for Irregular Warfare," *Marine Corps Gazette* 100, no. 1 (January 2016): 79–83; Maj Ian T. Brown, "The 'Grand Ideal'," *Marine Corps Gazette* 100, no. 2 (February 2016): 55–58; Maj Ian T. Brown, "Sprinting to Fight the Last War," *Marine Corps Gazette* 100, no. 4 (April 2016): 80–83; Maj Ian T. Brown, "Warfighting 3.0," *Marine Corps Gazette* 100, no. 8 (August 2016): 65–72.

its central warfighting doctrine. Its newest operating concept, *How an Expeditionary Force Operates in the 21st Century*, explicitly proclaims that “this warfighting philosophy [maneuver warfare] was, is, and will remain our foundation.”¹⁰⁵

Boyd’s work has even influenced the equally competitive, if somewhat less lethal, realms of business and politics.¹⁰⁶ Boyd followers both old and new still come together to discuss his work and influence, and find ways to apply his knowledge to current and future conflicts.¹⁰⁷ It is a testament to the power of John Boyd’s ideas that, born as they were in the midst of the Cold War, they have become today’s lexicon for framing and discussing future conflicts.

¹⁰⁵ *Marine Corps Operating Concept: How an Expeditionary Force Operates in the 21st Century* (Washington, DC: Department of the Navy, 2016), 8. Maneuver warfare is referenced and unreservedly applied throughout this publication, in domains from information operations to logistics to the training of the individual Marine. This stands in stark contrast to the Marine Corps’ previous capstone concept known as *Expeditionary Force 21*, which made no reference, explicit or otherwise, to the Corps’ purported capstone doctrine within its 47 pages. See *Expeditionary Force 21 – Forward and Ready: Now and in the Future* (Washington, DC: Department of the Navy, 2014).

¹⁰⁶ Osinga, *Science, Strategy and War*, 4; Chester W. Richards, *Certain to Win: The Strategy of John Boyd Applied to Business* (Bloomington, IN: Xlibris LLC, 2004); “John Boyd’s Guide to Hasbara,” Philip Gold, *The Times of Israel*, last modified August 31, 2015, accessed 10 October, 2016, <http://blogs.timesofisrael.com/john-boyds-guide-to-hasbara/>; “John Boyd and Israeli Retail,” Philip Gold, *The Times of Israel*, last modified September 3, 2015, accessed 10 October, 2016, <http://blogs.timesofisrael.com/john-boyd-and-israeli-retail/>; “Military Strategist Explains Why Donald Trump Leads—And How He Will Fail,” Dan McLaughlin, *The Federalist*, last modified December 16, 2015, accessed January 6, 2016, <http://thefederalist.com/2015/12/16/military-strategist-explains-why-donald-trump-leads-and-how-he-will-fail/>.

¹⁰⁷ Mark Safranski, ed., *The John Boyd Roundtable: Debating Science, Strategy, and War* (Ann Arbor, MI: Nimble Books LLC, 2008).