Col John Boyd's Innovative DNA

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Surprisingly, few Airmen have heard of Col John Boyd, and far fewer are aware of his innovative contributions to the advancement of modern-day airpower. As we consider what it means to be "fueled by innovation," I thought it appropriate to recognize an Airman who committed his entire career to innovation.[1] Although Boyd retired nearly 30 years ago, modern Airmen can learn from his success—we can identify the skills that truly fueled his innovation, develop them within ourselves, and spur our own creativity.

Boyd is most recognized for the development of his observe, orient, decide, act (OODA) loop decision-making process, now taught throughout professional military education. Arguably, his most important contribution to the advancement of airpower, however, was his 1970s energy maneuverability (E-M) theory, which revolutionized the study of fighter-jet dogfighting. His in-depth mathematical study of fighter aviation permitted, for the first time, an objective, science-based measure of an aircraft's maneuverability—a tool used almost daily at the US Air Force Weapons School. The theory identified which Soviet-built MiGs had a dogfighting advantage over our jets and vice versa. Given the context of the Cold War and the Air Force's disappointing air-to-air performance in Vietnam, this information was groundbreaking and important. But what character traits enabled Boyd's success? Borrowing from the book *The Innovator's DNA* by Jeff Dyer, Hal Gregersen, and Clayton Christensen, this commentary identifies the five traits of successful innovators and then determines how well John Boyd exemplified those traits.[2]

As Apple Computer's founder Steve Jobs put it, why do some people seem to "think different"? Why are some people more successful innovators than others? Dyer, Gregersen, and Christensen have developed an interesting hypothesis. They

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believe that five traits fuel innovators: *the ability to observe, associate, experiment, question, and network*.[3] Most importantly, if their theory is correct, then any advancement in developing these qualities should increase our own abilities to innovate. Not surprisingly, John Boyd demonstrated these characteristics in abundance.

He possessed keen observation skills. Boyd studied history, and following the Vietnam conflict, he was all too aware of the slipping kill ratios of American fighter pilots. Furthermore, as a highly respected Fighter Weapons School instructor pilot at Nellis AFB, Nevada, he spent countless hours maneuvering his F-100 jet in relation to numerous other fighter aircraft. He observed adroit pilots aggressively maneuvering their air machines against one another—simulated missiles and cannon fire streaking across the sky and downing the adversary. Other than pilot skill, though, no other attribute contributed to the explanation of why one aircraft outmaneuvered another. Boyd would not be able to explain his observations until he hung up his G suit and grabbed a scientific calculator.

While attending engineering courses at the Georgia Institute of Technology on a scholarship from the Air Force Institute of Technology, Boyd made an innovative association between science and flying jets. During his study of basic thermodynamic principles, he derived a mathematical equation to determine a jet's level of maneuverability based on basic information like thrust rating, aerodynamic drag, lift coefficients, and aircraft weight. His E-M theory codified what no scientist had before—certainly not your typical "knuckle-dragging fighter pilot."

Boyd committed himself to extensive experimentation to prove his new E-M theory. Verification of this complex hypothesis would require hundreds of hours of calculations by the most advanced computers available. Back in the 1960s, however, prior to the advent of the personal computer, access was very limited. Determined to prove his new theory, Boyd used his resourcefulness to gain much-needed computer access. In fact, some individuals almost considered a court-martial for what they characterized as "unauthorized" computer usage while he was stationed at Eglin AFB, Florida.[4] No one ever said that the path to innovation was an easy one!

One of Boyd's strengths was his ability to question everyone and everything around him. His E-M theory armed him to query things that few field grade officers would dare. As the Air Force wrestled with determining the capabilities of its future fighter aircraft, E-M theory gained credibility. Boyd could prove the inferior performance of advanced jets like the F-111 and F-14, compared to their Soviet counterparts. He used the theory to question the service's acquisition priorities and fought for the development of advanced fighters such as the F-15 and F-16—some people even credited him as the father of the F-16.

Throughout Boyd's career, he displayed expert networking skills. He loved to think out loud, often on the telephone to one of six trusted confidants during the wee hours of the morning. Over the years, he gained an affinity for calling his "acolytes" to solicit their perspective on his latest breakthrough. These men shared Boyd's passion for the truth and for doing what was right. Over time they began to share his goals and ideals. Through this trusted communication, Boyd refined his thoughts and prepared himself for the onslaught of disdain for his radical ideas outside his small circle of friends.

John Boyd was far from the ideal officer. He exhibited faults, some more exaggerated than most. Nevertheless, his strength lay in his ability to innovate, and he demonstrated the above-mentioned five traits linked to innovation. Modern Airmen should consider their own abilities in these important areas. Being "fueled by innovation" is more than a slogan. It is a commitment by all Airmen to spark their own creativity and develop these traits within themselves. In that effort, we can all learn from Boyd, celebrate his innovation, and further develop the innovator within each and every one of us.✪

Notes

1. Department of the Air Force, *The World's Greatest Air Force: Powered by Airmen, Fueled by Innovation—A Vision for the United States Air Force* (Washington, DC: Department of the Air Force, n.d.), http://www.osi.af.mil/shared/media/document/AFD-130111-016.pdf.
2. Jeff Dyer, Hal Gregersen, and Clayton M. Christensen, *The Innovator's DNA: Mastering the Five Skills of Disruptive Innovators* (Boston: Harvard Business Press, 2011).
3. Ibid., 41–156.
4. Robert Coram, *Boyd: The Fighter Pilot Who Changed the Art of War* (Boston: Little, Brown, 2002).

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