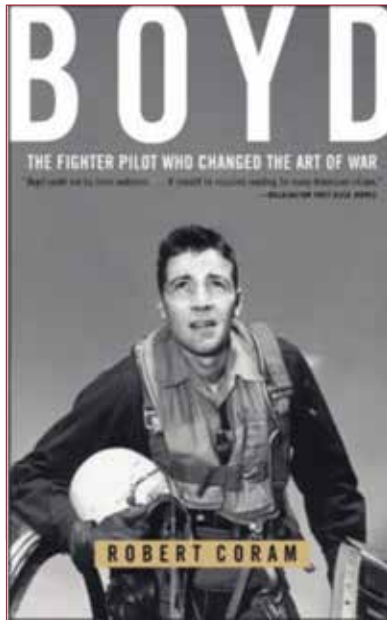


# Book Review



**Robert Coram, *Boyd: The Fighter Pilot Who Changed the Art of War*, (New York, Hachette Book Group) 2002, 504 Pages**

by **Wallace Tan**

## INTRODUCTION

If one were to ask any pilot about Energy-Maneuverability theory, the response is often an exuberant one. The same cannot be said when pilots are posed with questions on the origin of the Energy-Maneuverability theory. Most would give a blank stare, wondering who created the concept of Energy-Maneuverability, a theory that revolutionised the aviation sector ever since. He is none other than Colonel John R. Boyd. This book written by Robert Coram, categorises John Boyd's life into three sections: The Fighter Pilot, The Engineer and The Scholar. Coram looks into the times and events that moulded this aviation legend.

## BEGINNINGS

In the opening chapter, Coram gave a flashback to Boyd's childhood and youth. Boyd was born on 23<sup>rd</sup> January, 1927 in

Erie, Pennsylvania. His father, Hubert Boyd, died on John's third birthday, leaving John's mother, Elsie Boyd, the burden of having to raise the John and his sibling single-handedly. Elsie was a strong-minded, authoritative and unbending mother. After the death of Hubert, Elsie started working to support the family although their neighbours thought that Elsie never needed to, given that Hubert had a good paying job in a big local departmental store in Erie. Coram picked a few instances to highlight the resolute nature of Elsie. In one instance, the Catholic priest of the local church mocked John's sister for stuttering during catechism. After learning about the incident, she telephoned the priest and said, "*I have enough trouble trying to keep this family together without having a priest pick on my children.*" ending the conversation by serving notice that her children will no longer

attend the Catholic church.<sup>1</sup> On another instance, when John came home from school feeling upset that his teacher had asked him why his uniform and shoes were old and torn, Elsie comforted him by insisting that a person's character is much more valuable and important than the material wealth of that person; that as long as one's *"integrity was inviolate, he was superior to those who had only rank or money."*<sup>2</sup> She also taught John that a man of principle would frighten other people and that he would be attacked for his beliefs, but he must always keep the faith, quoting *"If you're right, you're right."*<sup>3</sup> Clearly, Elsie was instilling strict values on her children and wanted to ensure they will grow up with the right principles and values. Indeed, John was instilled strongly with those principles and values.

During high school, Boyd was a member of the swimming team, learning that *"It is just as affective, if not more, to learn and do something correctly and use less energy."* Upon completion of his high school, Boyd enlisted in the Air Force just after World War II (WWII) had ended. Boyd was stationed in post-war Japan as an enlistee before returning to the United States (US) for his pilot

training. Boyd was no stranger to controversy and confrontation as he clashed with his instructors over his pilot training assignment. Boyd then furthered his studies at the University of Iowa, majoring in economics. It was also there that he met his future wife, Mary Bruce. During the Korean War, Boyd was assigned to the F-86 Sabre. Though Boyd scored no kills and only managed to damage one Mikoyan-Gurevich (MiG) aircraft, he impressed his superiors and was chosen to attend the prestigious Fighter Weapons School near Las Vegas, where he eventually became an instructor after performing well during the course.

### **'40-SECOND' BOYD**

Unlike typical instructors who 'go by the book', Boyd always tried to 'tweak' conventional war fighting strategies. During lessons conducted by him, students are forced to think out of the box. Many of the students arrived at Fighter Weapons School knowing very well that they are the 'cream of the crop.' Therefore, it is not uncommon for the students to 'belittle' the instructors. Boyd knew he had to prove his skills to the students for them to be receptive to his unconventional ideas and teaching methods. Using the North American F-100

*Super Sabre*, he would bet any pilot \$20 that he could let them set up at his six o'clock position within their gun range in a fight simulator and within 40 seconds, he would have their positions reversed. He never lost a single bet. He made use of his experiences gained from the simulated air combat with the students to refine and improve on his theoretical concepts to the highest levels.

Coram then went on to describe how Boyd worked on writing his manual on air-to-air tactics using his own free time. The manual was accepted by the United States Air Force (USAF) and became an official military doctrine titled *Aerial Attack Study*. Boyd was awarded the Legion of Merit in recognition. Until then, air combat was viewed more of an art rather than a science. It was Boyd's work that categorised the different series of counter manoeuvres for every manoeuvre made during air combat. Boyd did not get complacent due to his achievements, in fact, he was just getting started. Boyd applied for a second bachelor's degree and was enrolled into the Industrial Engineering course at Georgia Tech, in search for more knowledge to aid his rigorous analysis of the combat capabilities of a fighter aircraft.

## ENERGY-MANEUVRABILITY THEORY

During a lesson on thermodynamics, Boyd's insight came on understanding the inter-conversion of energy and entropy in closed systems. That allowed him to realise that it is the amount of energy that the aircraft possesses that determines the victory of aerial combat. Fighter pilots have learnt that in aerial combat, possessing speed or altitude advantages over the opponent is crucial. What Boyd did was to turn that instinctive knowledge into a rigorous formula, which can be applied on any type of aircraft flying at any speed. This is known as the Energy-Maneuverability Theory, which enabled fighter pilots to evaluate their energy potential during aerial combat. Boyd then used his findings to plot the performance chart of every fighter aircraft in the USAF inventory. During the Vietnam War in the mid-1960s, the U.S. F-4 *Phantoms* and F-105 *Thunderchief* fighter jets were constantly out-won by MiG-19s and MiG-20s. Boyd was summoned to the Pentagon where he explained using his Energy Maneuvrability Theory that the big and powerful F-4 *Phantoms* and F-105 *Thunderchief* were at a

severe disadvantage to the smaller, lighter and more agile MiGs. He worked closely with the Pentagon thereafter in the development and production of the F-15 *Eagle* fighter aircraft that will remain as the best fighter aircraft for three decades. While working at the Pentagon, Coram pointed out that Boyd's confrontational nature got him into frequent 'battles' with the people he worked with, often higher ranked than him. Thankfully, Boyd was posted to Nakhon Phanom Royal Thai Air Force Base (NKP) as the vice-commander for a one-year assignment during the Vietnam War. Even when stationed there, he took every opportunity to visit the airbases, educating the F-4 *Phantom* pilots of the energy potential of their aircraft during aerial combat using his Energy-Maneuverability Theory, as well as that of the MiG-21, used by their enemies (the Communist Forces) at that time. His time at NKP allowed him to formulate new ideas which eventually led him to understand that destruction was a pre-requisite for creation. On 25<sup>th</sup> June 1975, Boyd was presented the Harold Brown Award by the Secretary of the Air Force. It was the highest award given by the USAF, typically awarded to individuals whose work has led to "a substantial improvement in the

operation effectiveness of the Air Force."<sup>4</sup> Boyd was only the second person in the US history to have received the award at that point of time.

## RETIREMENT AND DEATH

On 31<sup>st</sup> August 1975, COL John Boyd retired after 24 years of service. However, that did not mean Boyd's work stopped. Boyd published a condensed eight-page article entitled *Destruction and Creation* that intertwined ideas from Kurt Gödel and Werner Heisenberg together with the Second Law of Thermodynamics, "sketching out how we destroy and create these patterns to permit us to both shape and be shaped by a changing environment."<sup>5</sup> At the same time, Boyd continued to impart his knowledge on aerial combat warfare to anyone, including a senator from Wyoming, Dick Cheney. It was during one of these briefings that Boyd introduced the concept of the Observe, Orient, Decide and Act (OODA) Loop, a complex concept that took hours to explain. In essence, the OODA Loop is a thinking cycle every fighter pilot must process during an aerial combat. The victory will be decided

by who can function inside the time scale of his opponent's OODA Loop; the one who is faster will often be the one that will emerge victorious. This concept has been utilised primarily by fighter pilots and the United States Marine Corps (USMC). However concepts such as the one in the Strategy of the Fighter Pilot, are being employed by American businesses to 'outmanoeuvre' their rival businesses.

On 8<sup>th</sup> March 1997, Boyd succumbed to cancer and died in a hospital located at West Palm Beach, Florida. He was buried at Arlington National Cemetery with full military honours. Interestingly, the Air Force was under-represented during his memorial service. Despite not being a member of the USMC, a Marine Colonel present at the memorial service placed a Marine Eagle, Globe and Anchor insignia at Boyd's headstone to show appreciation for his contributions and ideas that were adopted by the Marine Corps. According to Coram, this is the highest honour a Marine can ever be bestowed and Boyd became the first Air Force pilot to receive it.

It is true that it can be difficult to understand Boyd's work due to its complexity. Coram's admiration of Boyd can be seen through the book. However, he made no attempt to hide Boyd's flaws. Like every great man, Boyd has his own flaws and weaknesses; no one is perfect. You may disagree with Coram's views on Boyd after reading the book, but you will surely get some valuable takeaways on how the Pentagon works and where the concepts of modern fighter tactics come from. Therefore, this book is a must-read for those seeking to gain a better understanding of the modern US military. 🌐

*"Tiger, one day you will come to a fork in the road. And you're going to have to make a decision about which direction you want to go. If you go that way, you can be somebody. You will have to make compromises and you will have to turn your back on your friends. But you will be a member of the club and you will get promoted and you will get good assignments. Or, you can go another way and you can do something - something for your country and for your Air Force and for yourself. If you decide you want to do something, you*

*may not get promoted and you may not get good assignments and you certainly will not be a favourite of your superiors. But you won't have to compromise yourself. You will be true to your friends and to yourself. And your work might make a difference."*

*Colonel John Boyd<sup>6</sup>*

## ENDNOTES

1. Robert Coram, *Boyd: The Fighter Pilot Who Changed the Art of War* (United States: Little, Brown and Company, 2002), 18.
2. Ibid.
3. Ibid.
4. "Harold Brown Award", *Wikipedia*, [http://en.wikipedia.org/wiki/Harold\\_Brown\\_Award](http://en.wikipedia.org/wiki/Harold_Brown_Award)
5. John R. Boyd, "Destruction and Creation", <http://globalguerrillas.typepad.com/JohnBoyd/Destruction%20and%20Creation.pdf>.
6. Robert Coram, *Boyd: The Fighter Pilot Who Changed the Art of War* (United States: Little, Brown and Company, 2002)