Col. John Boyd
More than the OODA Loop

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Col John Boyd –
More than the OODA Loop

Primarily based on the book
Boyd: The Fighter Pilot Who Changed the Art of War
by Robert Coram

Col John Boyd

Introduction
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Korea
Nellis AFB
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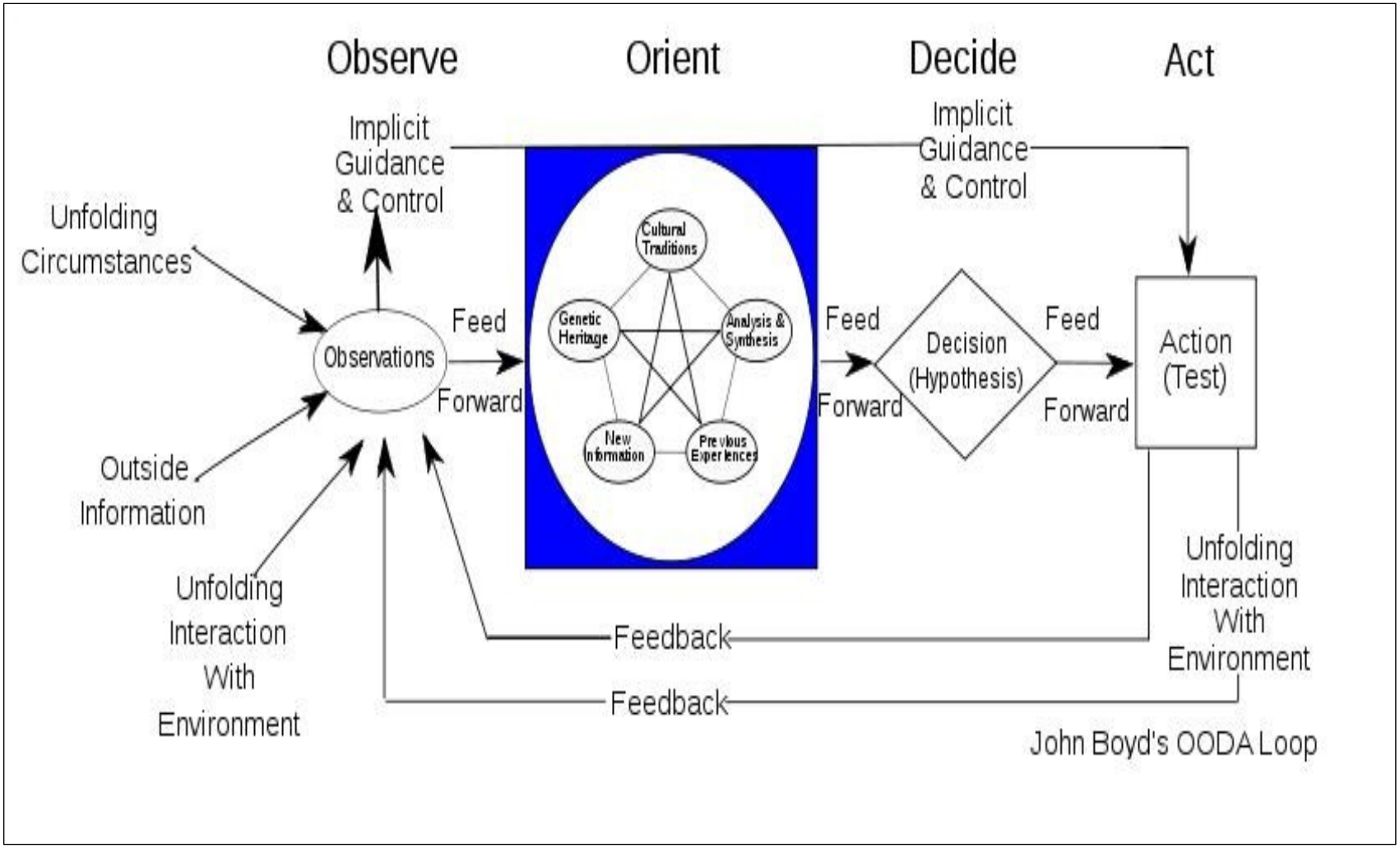
Introduction

Col Boyd is primarily remembered for his OODA Loop

Observe
Orient
Decide
Act

Introduction



Introduction

The OODA Loop is the basis for the AF 8-Step Problem Solving Process
Observe:
Step 1 – Clarify & Validate the Problem
Step 2 – Break Down the Problem / Identify Performance Gaps
Orient:
Step 3 – Set Improvement Targets
Step 4 – Determine Root Causes
Decide:
Step 5 – Develop Countermeasures
Act:
Step 6 – See Countermeasures Through
Step 7 – Confirm Results & Process
Step 8 – Standardize Successful Processes

But Col Boyd was much more than the developer of the OODA Loop …

Birth and Early Life

John Richard Boyd was born 23 Jan 1927 in Erie, Pennsylvania

Army Air Corps

During World War II, he enlisted on 30 Oct 1944, when he was a junior in high school

He was discharged on 7 Jan 1947

Boyd attended the University of Iowa, graduating with a Bachelor's of Economics

During the Korean War, he enlisted in the Air Force on 8 Jul 1951

He married Mary Ethelyn Bruce

They eventually had five children

Korea

Boyd arrived in South Korea as a fighter pilot on 27 Mar 1953
Hostilities ended before he had a chance to shoot at a MiG
He became intrigued with the relative performance of the MiG-15 vs F-86
On paper, the MiG-15 was superior is almost every respect
But the F-86 had a 792 to 78 (over 10-1) kill advantage over the MiG-15
Why?
Superior pilots and training could be a factor
Visibility – the F-86 has a bubble canopy with 360-degree visibility, while the MiG-15 pilot's visibility is blocked to the rear; therefore, the F-86 pilot has better situational awareness
The F-86 has full hydraulic controls which the pilot can operate with one finger, while the MiG-15 has manual controls, resulting in the MiG-15 pilot becoming fatigued more quickly and taking more time to go from one maneuver to another than the F-86 pilot

Nellis AFB

Boyd arrived in Apr 1954 as a student in the Advanced Flying School (AFS)

Upon graduation, he became an instructor in Fighter Weapons School (FWS)

There was no air-to-air tactics manual, so Boyd decided to write one

This became his Aerial Attack Study

In 1960, it became the official tactics manual for fighter aircraft

Fighter tactics were no longer a “bag of tricks”

It provided instructions for dealing with any situation a pilot was likely to encounter

Boyd decided he needed to better understand the math and physics behind fighter performance, so he chose to pursue an engineering degree

Nellis AFB

“Forty-Second Boyd”

One of Boyd’s teaching tools was to have the student place his fighter on the six o’clock position of the instructor’s aircraft and stay there as the instructor goes through evasive maneuvers

This developed into a standing offer:

With an adversary on his six, Boyd would either be in position to shoot down other fighter within 40 seconds or he would pay the pilot $40

Boyd never lost, to students or to experienced AF, Navy, Marine Corps, or foreign exchange pilots

Georgia Tech

Started class in Sep 1960

Majored in Industrial Engineering

Developed his Energy-Maneuverability (E-M) Theory

Graduated after Summer Quarter 1962

Energy-Maneuverability (E-M) Theory

T = Thrust
D = Drag
W = Weight
V = Velocity

Provided a quantitative basis for developing aerial tactics

Changed how aircraft are flown in combat

Provided a scientific means for evaluating maneuverability of aircraft

Tactics to overcome limitations of own aircraft

Tactics to minimize or negate superiority of opponent aircraft

Tool for designing fighter aircraft

Eglin AFB

After graduating from Georgia Tech, Boyd was stationed at Eglin AFB, Florida

He concentrated on his E-M charts, where he compared US fighter aircraft with Soviet fighter aircraft in all parts of the flight envelope – any altitude and any speed

Eglin AFB

The F-111

The F-111 was in development at the time
It was Secretary of Defense Robert McNamara's universal fighter for the AF and Navy, supposed to reduce:
Development costs (only one aircraft to be developed)
Production costs (increased quantities of one design)
Swing wing design
Lower takeoff and landing speeds for carrier operations
Better high speed performance
However, this significantly increased weight
Boyd's E-M charts showed that Soviet aircraft could defeat the F-111 at any altitude, any airspeed, in any part of the flight envelope

Eglin AFB

Boyd was awarded the Air Force Systems Command (AFSC) Scientific Achievement Award, the highest scientific award in AFSC

He was also awarded the Air Force Research and Development Award for Aeronautical Engineering, the highest scientific award the AF gives to an officer

The Pentagon

F-X

In 1966, Boyd was transferred to the Pentagon to work on the troubled F-X, the new AF fighter

The original F-X was a large, heavy, swing wing design that repeated the mistakes of the F-111

Although only a major at the time, Boyd used his E-M Theory to justify eliminating the swing wings and drastically reducing weight

The resulting F-15 was the first AF fighter designed for dogfighting

However, Boyd was not pleased, as he thought the F-15 was still too heavy and too compromised

The Pentagon

Lightweight Fighter

Unhappy that he thought the F-15 was too heavy and too compromised, Boyd began work on the Lightweight Fighter

It was to be light, simple, and inexpensive

Two contractors, General Dynamics and Northrup, were selected to build prototypes for a fly-off competition

General Dynamics won the competition to build what became the F-16

However, Boyd was not pleased, as he thought the F-16 was still too heavy and too compromised

The Pentagon

On 25 Jun 1975, Boyd received the Harold Brown Award, the highest scientific award presented by the AF

Citation noted how E-M Theory was used for designing the F-15 and F-16

It stated that E-M Theory gave the AF the means to “forge a superior fighter force in the decades ahead”

Boyd retired from the AF on 31 Aug 1975

He continued to work as a DoD consultant

Later Life

Boyd moved to Delray Beach, Florida, in 1988; he continued to work as a DoD consultant

In Jan 1980, he began working with the Marine Corps, developing "Maneuver Warfare"

He served as an advisor to Secretary of Defense Dick Cheney during Operations Desert Shield and Desert Storm

Three days before the war officially began, the Marine Corps executed a raid deep behind Iraqi lines, perfectly executing "Maneuver Warfare," resulting in 15 Iraqi divisions surrendering to two Marine Corps divisions

Anecdotal evidence suggests the famous "Left Hook" was Boyd's idea

Boyd died of cancer on 9 Mar 1997 in West Palm Beach, Florida

His ashes are buried in Arlington National Cemetery