30 Seconds Over Tokyo
by Captain Ted Lawson

An Adaptation via Thinking Processes Affording Joy in Learning and Logical Analysis

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A Prelude to War
WWI NEGOTIATIONS

The Horrors of New Wars

- World War I demonstrated to the world the horrors of global warfare.
- Battleships and aircraft carriers played a new role in the global warfare.

The US, Great Britain, and Japan agreed to a 5:5:3 battleship/carrier tonnage ratio to limit naval growth.

The US had two oceans to defend, the British Empire three, but the Japanese only one.

The 5:5:3 agreement actually favored the Japanese.
A PATH OF AGGRESSION

Japan versus China

Japan annexed Manchuria in 1931.

The USA and the Leage-of-Nations objected to the Japanese annexation.

Japan dropped out of the LON, and refused to abide by the naval 5:5:3 Naval Provisions.

In 1937, Japan again waged war against China in the second Sino-Japanese War.

By not intervening was evidence we would never intervene in Japanese conquests.
MANCHURIA (Manchukuo)
Annexed by Japan in 1931
(“Japan” here is Japanese-occupied Korea)
TRI-PARTITE AXIS POWERS

Japan Enters WWII

The US was selling huge quantities of iron, steel, and oil to Japan, despite the Japanese aggression.

In the summer of 1940, finally, the US prohibited the exportation of war materials to Japan.

Civil relations between the Japanese and the USA were breaking down.

Japan saw an alliance with the axis powers would work to their benefit.

Japan signed a formal treaty of alliance with the European axis powers Germany and Italy.
FRENCH INDOCHINA
DECISION TIME

What Should Japan Do?

- Japan invaded French Indochina to block shipment of oil to China.
- The USA, alarmed by the Japanese move, cut all oil exports to Japan.

- Japan now was without oil from the USA.
- The Japanese, lacking their own natural resources, got most of their oil from the USA.

- The Japanese faced a crucial decision.
A DILEMMA
What Should They Do?

Japan needs oil, and gets most of it from the USA.

The USA will not trade oil with Japan until Japan retreats from China and Indochina.

Japan must retreat to get oil from the USA.

Wanting to create a "Greater East Asia Co-Prosperity Sphere", Japan did not want to return captured land.

Japan must seek another source of oil.
AN ALTERNATIVE SOURCE
In Search of Oil, a Fight was Inevitable

Japan must seek another source of oil.
The Dutch East Indies had a great deal of oil.

The Japanese would invade the Dutch East Indies, and continue its conquest of SE Asia.
The USA would not sit idly by while Japan was further invading SE Asia.

A conflict with the USA was inevitable.
A PRE-EMPTIVE ATTACK
Defeating the US Pacific Fleet

A conflict with the USA was inevitable.

The US Pacific fleet was now stationed at Pearl Harbor in the central Pacific.

A surprise attack on Pearl Harbor would cripple the Pacific fleet.

The USA west coast would be vulnerable to Japanese attack.

The USA would sue for peace before a war even began.
PEARL HARBOR
The Pacific Fleet - Damaged but not Destroyed

Pearl Harbor was attacked on December 7, 1941.

The US aircraft carriers were not at port at Pearl Harbor during the Japanese attack.

The US aircraft carrier fleet was still in tact, though the fleet in general was greatly damaged.

Though not completely destroyed, the Japanese felt no fear of USA reprisal.

The Dutch East Indies fell, as did other countries in SE Asia.
ROOSEVELT

Let's Bomb Japan

Roosevelt announced on December 21, 1941 the USA should bomb Japan.

Fighter and attack planes aboard the surviving aircraft carriers would inflict little damage.

Bombers would have to bomb Japan.

There were no USA bombers in the Asian theatre.

Bombing Japan seemed an impossibility.
AN IDEA TAKES SHAPE

B-25s

The Army air-force was practicing bomber attacks on carriers on the east coast.

To simulate bombing runs on a carrier requires something similar to a carrier.

A carrier-outline was painted on a runway to simulate an actual aircraft carrier.

Francis Low saw the B-25s making passes over the outline and realized these bombers would actually fit on a carrier!

An idea took shape.
The Doolittle Raid

A Get-Back Plan
THE DOOLITTLE RAID
A Get-Back Plan

- Jimmy Doolittle, famed aviator, would lead and train a group of B-25 teams.
- 16 bombers would be loaded aboard the USS Hornet, the newest aircraft carrier in the fleet.

With a naval escort, the carrier would get within launching distance of the Japanese coast.

The B-25s, medium-range bombers, could carry heavy bombs and fly long distances.

We could bomb Japan!
JIMMY DOOLITTLE
1896 - 1993
American Hero
TAKE-OFF
A Carrier Take-Off With a Fully-Loaded B-25

The USS carrier had 500 feet of take-off space for the B-25s.

A fully-revved engine with breaks on would allow the B-25 ample speed for takeoff.
LANDING
China or Russia?

After dropping the bombs in Japan, the B-25s need to land.

Though possible, a carrier landing would be dangerous.

The B-25s would need to land on land.

Though Vladivostok, Russia, was close, Russia was not officially at war with Japan.

A landing site in China (at war with Japan) was the obvious next choice.
LANDING
Safe Havens in China

After bombing Japan, the B-25s would land in Chuchow, about 200 miles south of Shanghai.

After refueling in Chuchow, the B-25s would fly on to Chungking, China's wartime capital.

The B-25s and crews would be safe in allied territory.

The Tenth Air Force was forming around Chungking for combat duty against the Japanese in China.

Munitions were available for the war effort, while some crew would make it back to the USA.
A CHINESE DILEMMA
Allowing the Bombers to Refuel in Chuchow (or not)

The Sino-Japanese war is going on.

The American bombers will bomb many cities in Japan, but need refueling afterwards.

The Chinese should allow the bombers to land on Chinese land and refuel.

The Japanese will track down the bombers, and likely kill anyone suspected of aiding the Americans.

The Chinese should not allow the bombers to land on Chinese land and refuel.
THE LIMITS

Launch Distances

The stripped B-25b's had a range of approximately 1,850 miles.

It was 1,200 miles from Tokyo to Chuchow, China.

Though Task Force 16 hoped to launch at 400 miles, the maximum distance the B-25b's could be launched was 650 miles from Tokyo.

Task Force 16 was sighted 624 miles from Tokyo.

The 16 B-25b's, with Doolittle taking off first, all left the Hornet in approximately 1 hour!
THE FEAR
The Danger in Being Sighted

Task Force 16 has only two carriers, the Hornet loaded with 16 B-25b's, and the Enterprise, loaded with fighters.

There are no fighter planes aboard the carrier Hornet.

Task Force 16 has little air support.

Task Force 16 is sighted and it's position radioed to the Japanese mainland force.

Task Force 16 would be extremely vulnerable to Japanese attack.
THE DOOLITTLE RAID
A B-25b Taking Off from The Hornet
April 18, 1942
THE RESULTS

The Positives of the Doolittle Raid

The Japanese believed they were not vulnerable from a sea attack.

The Doolittle Raiders successfully bomb Japan.

The Japanese will pull forces from its offensive deployment to protect the homeland.

The USA - with low morale following several defeats - would have something to cheer about!

The Doolittle Raid will be successful.
MIDWAY
An Unintended - but Predictable Result

The Japanese did not want to remain vulnerable to sea attacks.

Sea attacks were possible because of the remaining US fleet at Pearl Harbor.

The Japanese must attack Pearl Harbor (again).

The Japanese knew we would not allow Pearl Harbor to be attacked a second time.

The Japanese could draw out US forces from Pearl if Midway was attacked!
(The Battle of Midway is another story, coming shortly!)

A Biography of a Different Kind
His actions helped win World War II.
You now know the story of the famous Doolittle Raid.

But when I said his actions helped with World War II, I was not referring to the Doolittle Raid! Instead, I’d like to talk about his role as a Vice President of Shell Oil several years before Pearl Harbor!

He recommended high octane aviation fuel – avgas – become the standard fuel for military aviation.

Who was Jimmy Doolittle, and why was this important?

JIMMY DOOLITTLE
A Brief Biography
He was born on December 14, 1896, in California, lived for a time in Alaska before returning to California, living in Los Angeles.

And at the age of 13, he attended the 1910 Los Angeles International Air Meet, what the LA Times then called “one of the greatest public events in the history of the West”.

It’s difficult for us living now to understand the significance of such an event. Arthur C. Clarke, in writing the book “3001”, talked of humans being transformed a thousand years into the future, and wondered if the 20th-century man would be astonished – *intellectually* – by what they found. He doubted it. Modern man is used to the radio, TV, the DVD, internet, cell phones, flight, transcontinental travel, space travel.

But the 19th century man transformed into the 20th? Yes. Everything – technologically – was new. But the 20th century man into *any* part of the future? He doubted it. There wouldn’t be that great a paradigm shift, intellectually, whatever changed.

When Doolittle was born, of course, none of this was around, and most would not be around for more than half-a-
century. The country was mesmerized by flight. An 11-day air-show! A quarter-of-a-million people in attendance!

After graduating from high school, he studied engineering in college, before taking a leave to enlist in the Signal Corps Reserve as a flying cadet.

It was 1917. World War I was raging across Europe. He became a flight instructor. A gunnery instructor.

After the “Great War” ended, he returned to complete his degree. And he continued to fly.

In an article I wrote titled “Johnson County – The Aviation Capital of the World”, I laid out – chronologically – “breakthroughs” in the aviation community.
The Aviation Pavillion
Aviation Park, Overland Park, KS
To this list, I’d like to add three more breakthroughs. Yes, Calbraith Rodgers was the first to make a transcontinental flight, but his flight took 49 days! In fact, the quest was in response to a challenge by published William Randolph Hearst to make it across the country in less than 30 days!

In September 1922, Doolittle became the first to fly across the country in less than one day – 2,163 miles in a total elapsed time of 22 hours, 30 minutes.

DeLloyd Thompson was the first to perform 8 rolls. Stunts were inevitable. Loops were exciting. “Inside” loops, that is, where the pilot is on the inside of the circle, like a car performing a loop on a roller-coaster ride. But an “outside” loop, where the pilot is facing out? Unheard of. Undone.

Doolittle did it – in 1927.

Doolittle set a speed record of 232 MPH in 1925.

Doolittle would break this record in 1932, reaching 296 MPH.

And after having won the three big air-racing trophies of the time, he officially retired from air-racing.

Remarkable.
Remember, after World War I, he returned to the States to get his degree. Not only was he a flight instructor and a gunnery instructor, before the war he was going to school as an engineer. After World War I, the army gave him two years to complete his Master’s Degree in Aeronautics.

He enrolled in MIT, and completed the program in one year, becoming the first person in the United States to receive this degree. Having done this in one year, he spent his second year earning his Doctorate!

As a test pilot setting speed records and performing stunts, one of the things he realized was the inability of the pilot – perceptually – to keep up. It was easy to become disoriented, particularly as speeds increased – and they would, he knew. Further, weather conditions hampered one’s ability to fly, as did the mere setting of the sun.

Again, we’re used to 24 / 7 / 365 flying, a sky perpetually filled with blips. Pilots are able to set the instruments to automatic and let the computer take over.

There were no computers, of course, in the first half of the 20th century.

In fact, there were few instruments! Flight was done by sight. “Contact” flying.
Doolittle knew this was a problem. He also was in a unique position to do something about it, with his background of test pilot and Doctor of Science!

He designed many of the instruments that still exist today in the cockpit of an airplane.

Of course, not only did he design these, he was the first to fly – *takeoff, fly, and land* – by instruments alone!

He was in his mid-30s now, and had already accomplished a lifetime’s worth of achievements! Retired from the racing-season, inactive militarily, he was now a Vice President at Shell Oil.

And he was still paying attention. And something caught his eye. One racer now was winning more than others. *Why?* Observing his engine, some noticed higher-compression pistons, and had them installed in their planes. The pistons in their planes, however, burned out.

*Why?*
Doolittle found out. It wasn’t the pistons by themselves. It was the pistons *combined with a new type of fuel* – a high-octane fuel.

He knew more powerful fuel would be necessary as flight became more popular in the United States. And he knew a more powerful fuel would help military craft.

But the military was against it. Their thought was to have a single fuel during wartime to simplify supply problems in wartime.

And Shell Oil wasn’t on board, either. It would cost millions and millions of dollars for Shell Oil to retool their machinery. Could he really make the argument this was the way to go?

Tests were run. 15% – 30% more power. 15% better fuel efficiency. The Army subsequently ordered all aircraft engines built after January 1, 1938, designed for 100-octane fuel.

Shell Oil had gambled as well. And they would eventually go from supplying 20 million gallons of airplane fuel annually to 20 million gallons of high-octane fuel daily with the onset of World War II.
What would our planes have done, with 30% less power? 15% less fuel efficiency? We can only guess. Or maybe not! Can it be the case 100 octane versus the standard 87 octane really had that great an impact on the war? A 2009 Press Release from the Royal Society of Chemistry tell us:

www.rsc.org/AboutUs/News/PressReleases/2009/SpitfireFuel.asp

THE SECRET FUEL THAT MADE
THE SPITFIRE SUPREME

13 May 2009

The Royal Society of Chemistry (RSC) recently published a paper exploring the “miracle” chemical breakthrough that gave Britain’s Spitfire and Hurricane aircraft the edge over German fighters during the Second World War.

American science writer Tim Palucka claims, because of the superior altitude, maneuverability, and rate of climb achieved because of the high-octane fuel, the Spitfires and Hurricanes gave the British fighters in the summer of 1940 the edge over the Luftwaffe above the English Channel and in the skies of London and south-east England.
“That (chemical) process would make a crucial difference in mid-1940 when the Royal Air Force started filling its Spitfires and Hurricanes with the 100-octane gasoline imported from the United States instead of the 87-octane gasoline it had formerly used ... Luftwaffe pilots couldn’t believe they were facing the same planes they had fought successfully over France a few months before ... The planes were the same but the fuel wasn’t.”

The battle now favoring the British, the German invasion was abandoned and Hitler turned eastwards, allowing the UK armed forces time to regroup and to revive.

How much speed could a simple fuel change make? The RSC continues: “The 100-octane fuel that resulted from the Houdry Process increased the Spitfire's speed by 25 mph at sea level by 34 mph at 10,000 feet.”

100 octane aviation fuel. It changed the course of the war – and maybe history. And it almost wasn’t! One wonders what might have been the case had it not been – for Jimmy Doolittle taking a “calculated risk”: 

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“I think there are two great benefits of an advanced degree: one is the increased knowledge and greater capability that you have, and the other is the prestige it gives you with your associates, particularly those who also have advanced degrees, so I took a calculated risk in pushing vigorously for what I believed was not only good for Shell but good for the military as well. I believed in 100-octane fuel, but I would not have been able to sell the idea had I not had the educational background that the Army had given me.”

Jimmy Doolittle’s Autobiography

I Could Never Be So Lucky Again