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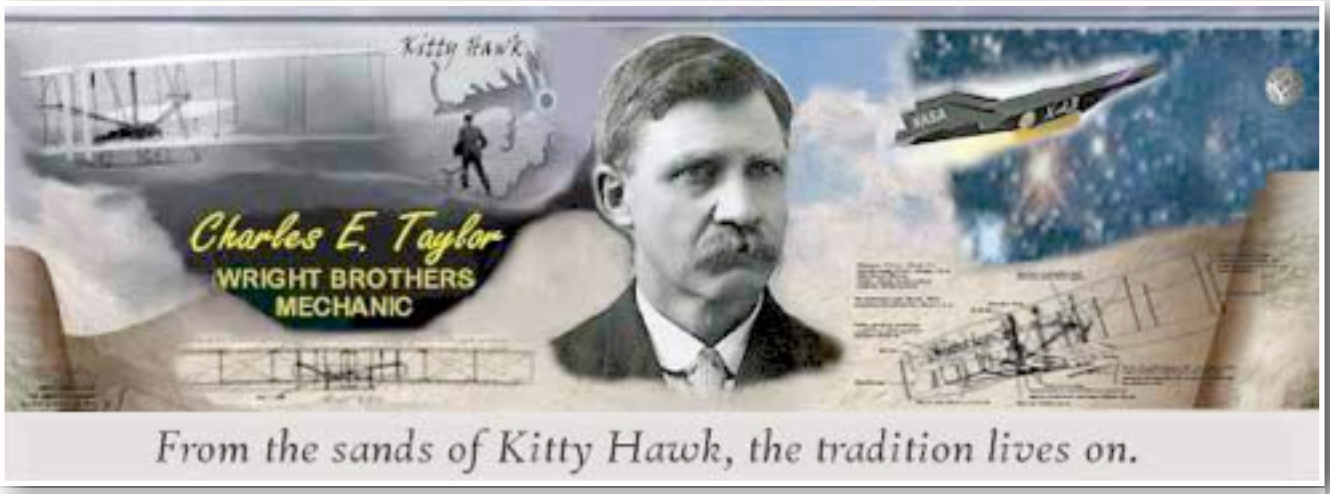

Hello all,

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In this weeks edition of *Aviation Human Factors Industry News* you will read the following stories:

Cognitive psychology research suggests pilots could be learning the wrong lessons from close-calls

New research provides evidence that two common cognitive biases could impact pilot's perception of past events in ways that adversely affect how they make future decisions.

The findings, which appear in the journal Applied Cognitive Psychology, indicate that pilots could be learning the wrong lessons from close-calls - thanks in part to an error in thinking known as an outcome bias.

"I have been involved in aviation for many years; one of my key research areas has been the role cognitive biases play in pilot decision making. In aviation, when a poor decision is made, the consequence can be catastrophic, therefore having a greater understanding of what leads to poor decisions is an important step to improve aviation safety," said study author Stephen Walmsley, who received a PhD in Aviation from Massey University.

The researchers were particularly interested in the often fatal mistake known as flying "VFR into IMC" - when pilots operating under visual flight rules inadvertently fly into low-visibility conditions that require instrument flight.

"Learning from previous poor decisions is imperative to avoid future mistake. However, what if our perception of past events is not a true reflection of what happened? This study explored cognitive biases that can influence our ability to learn from past events," Walmsley told PsyPost.

"Consistent with other professional fields, pilots were influenced by outcome and hindsight bias. Of particular interest and concern was that 'close-call' events were treated similar to positive/safe outcomes."

"Although the eventual outcome for a close call is the same as for a positive outcome, considerably more luck may be required in the close-call situation to achieve that outcome. This may limit the learning opportunity from close-call events and reinforce risky behavior," Walmsley said.

To examine the potential impact of outcome bias, the researchers had 142 pilots read several fictional scenarios in which non-instrument rated pilots had taken off into questionable weather.

The beginning of each scenario was the same for each participant, but the researchers manipulated the outcome of the flight. In some cases, the flight was conducted without incident and the pilot landed safely. In close-calls, the pilot inadvertently entered instrument meteorological conditions but was able to safely turn around to regain visual conditions. In other cases, however, the pilot inadvertently entered instrument meteorological conditions and then crashed.

After reading each scenario, the participants were asked to rate the decision-making ability of the pilots and how much risk the pilots took.

The researchers found that the outcome of the scenarios had a significant impact on how the participants viewed decision-making and risk. Pilots who did not encounter any incidents were viewed as having better decision-making abilities and taking less risk than those who crashed - even though both hypothetical pilots took off into the same conditions.

Worryingly, participants treated pilots who had close-calls very similarly to pilots who did not encounter any incidents.

To examine the potential impact of hindsight bias, the researchers had another 62 pilots read about three planned cross-country flights which had yet to take place and then state their confidence regarding whether the flight would be safe/ uneventful, require the pilot to turn around after encountering weather conditions, or result in a crash.

Ten days later, the participants were presented with the same three flights. This time, however, the participants were told the outcome of the flight. They were then asked to recall their initial predictions.

The participants tended to demonstrate hindsight bias for flights that ended safely and flights that ended in a crash. In other words, the participants believed they had originally assigned a higher probability to these outcomes than they actually did.

"Aviation is very safe, especially when compared to other modes of transport. Aircraft accidents are rare and when they do happen involve a range of factors. The cognitive biases highlighted in this study are unlikely by themselves to result in an accident, but can lead a pilot one step closer," Walmsley explained.

"Caution needs to be applied when generalizing these findings to the wider aviation population. The study participants primarily operated smaller aircraft with limited flight experiences."

The study, "Understanding the past: Investigating the role of availability, outcome, and hindsight bias and close calls in visual pilots' weather-related decision making", was authored by Stephen Walmsley and Andrew Gilbey.

Safetyn'Box GA Pilot Assistant Makes Debut

Under the banner "Preserving lives," French startup Safetyn (Hall Concorde Zone Protect) unveiled its Safetyn'Box, a portable cockpit device for General Aviation aircraft and key component in a system designed to improve safety via the "human factors axis." The device, announced this week at the Paris Air Show, collects data during flights that can ease single-pilot operations, helping pilots "anticipate some emergency situations that may potentially lead to a crash," the company said.

Critically, this data can later be used for ongoing analysis of the pilot's situational awareness. In addition to flight data, Safetyn'Box records information on the pilot via sensors connected to the device. All data remains confidential, with protections exceeding General Data Privacy Regulation requirements, according to Safetyn.

The analysis function is handled by Safetyn'Labs, the system's second component, which aims to help pilots develop their "safety situational awareness" through personalized courses with pilot-coaches. These sessions, using virtual reality simulators and scenario-based training, help pilots develop an understanding of risk situations.

In addition to Safetyn'Box, Safetyn's pilot coaches are at Le Bourget this week to showcase the company's human factors-based approach to safety.

Flight Deck Extra - Do You See What I See

Listen as aviation professionals discuss how critical it is not just to understand weather but also to understand how to know the limits of weather depiction. As you will hear, that can vary depending on where you are sitting.

In this conversation we will hear multiple points of view from:

- Dan Boedigheimer—Business aviation pilot and CEO of Advanced Aircrew Academy
- Dan McCabe—FAA air traffic controller based at Atlanta Center
- John Kosak—NBAA manager of weather programs, based at the FAA Air Traffic Control Command Center in Warrenton, Virginia

LISTEN TO THE EPISODE

Safety Through and Through

Everyone has had a time when they did not get enough sleep. Some people deal with a lack of sleep better than others. One person may only feel slightly groggy in the morning, while another feels like they are the walking dead all day long. Either way, it is important to realize when you are not as well rested as usual and take the proper precautions, especially in the work place.

Recently I came to work at 6 p.m. after having stood watch from 12 a.m. to 8 a.m. the same day. I was tasked to work on an aircraft, safety wiring the beta feedback target >

mounting bolts on a propeller blade. As I was safety wiring the bolts, the wire snapped and penetrated my left thumb, going through to the other side.

I had followed each step of the procedure correctly and had been wearing the appropriate personal protective equipment; however, the wire still snapped and I still ended up with a piece of metal sticking out of my thumb. The only outside factor I could identify was the fatigue from working an eight-hour duty shift during normal sleeping hours; which left less alert than I should have been on the day the incident occurred.

Staying alert and practicing good operational risk management (ORM) by utilizing the following simple five-step process can help reduce the probability of a workplace injury.

These five steps are:

1. Identify hazards

2. Assess the hazards

3. Make risk decisions

4. Implement controls

5. Supervise and watch for change

Sometimes you can take all the proper precautions, but accidents still can happen. It is important to recognize all the internal and external factors that are in place. In this case, I was fatigued and something may have gotten past my usual scan. I was lucky to have been able to walk away with such a small wound and only having missed a few hours of work.

Leaking fuel cap leads to fuel exhaustion

The pilot reported that, near the conclusion of a long cross-country flight, the engine suddenly lost partial power.

He declared an emergency with air traffic control and was advised that the nearest airport was about five miles behind him. He reversed course and began heading toward the airport.

Unable to reach the airport, he initiated a landing to an open field near Doniphan, Missouri. During the landing roll, the Cessna 182 hit a fence and a detached garage.

The airplane sustained substantial damage to the fuselage, empennage, and both wings.

Post-accident examination of the airplane revealed blue-colored fuel streaking from the right wing fuel cap to the trailing edge of the flap. Both fuel tanks were empty.

The pilot reported he was aware before the flight that the right wing fuel cap was leaking and that it had been leaking since he purchased the airplane about six months before the accident.

Probable cause: The pilot's improper decision to take off with a known fuel leak, which resulted in a loss of engine power due to fuel exhaustion.

NTSB Identification: GAA17CA361

This June 2017 accident report is provided by the National Transportation Safety Board. Published as an educational tool, it is intended to help pilots learn from the misfortunes of others.

AIR NEW ZEALAND USES DRONES FOR AIRCRAFT INSPECTIONS

Drones and aircraft don't usually mix but Air New Zealand says it can use the airborne robots to drastically reduce the time it takes to inspect an aircraft.

The New Zealand carrier has teamed up with maintenance, repair and overhaul provider ST Engineering to trial the concept, called DroScan, at the MRO's provider's facility next to Singapore's Changi Airport.

It is here AirNZ planes undergo heavy maintenance checks and the unmanned drones developed by ST Engineering are doing a job that would previously be performed by an engineer on a boom lift.

The drone takes a planned route around the outside of an aircraft to inspect its surface and take high definition images.

The images are processed using software with smart algorithms to detect and classify defects that can be reviewed by engineers.

"Using a drone to inspect our aircraft will save time, taking around one to two hours, compared to up to six - depending on aircraft type - which means repairs can start sooner if needed, >

and our aircraft will be able to get back in the air more quickly," said Air New Zealand chief ground operations officer Carrie Hurihanganui .

"We've trained using DroScan on a number of our aircraft undergoing maintenance inspections in Singapore now and believe using a drone will also help improve inspection quality.

"In future, there may be an opportunity to use the device in New Zealand, for example to conduct ad hoc inspections after lightning strikes."

ST Engineering Aerospace sector deputy president Jeffrey Lam said the project combined traditional aircraft engineering skills with new skills such as software and data analytics.

"Our engineers can now focus on higher value-added activities by spending their time on analyzing the defects and developing solutions for the defects rather than spending time climbing all over the aircraft to look for the defects," he said.

Air New Zealand and ST Engineering are also collaborating to manufacture 3D printed replacement interior parts and on data analytics to optimize maintenance activities.

U.S. Lawmaker to Introduce Bill on Aircraft Maintenance Disclosure

The legislation would require carriers to disclose more information about their maintenance activities to the public.

U.S. Rep. John Garamendi (D-California), a senior member of the House Transportation & Infrastructure

(T&I) Committee, plans to re-introduce legislation this summer that would require carriers to disclose more information about their maintenance activities to the public.

Garamendi introduced the legislation last year under the Committee's former Republican chairman Bill Shuster, but it didn't go anywhere. He said he's hopeful that the Committee's Democratic leadership will be more receptive to the proposal this time.

"As a person who spends at least 5,000 miles a week on an airplane, I want to know that airplane is well maintained, and I want to know where its maintenance was done, so I can hold that airline accountable," Garamendi said at the Aircraft Maintenance Outsourcing Summit in Washington, DC on June 4.

The bill would require carriers to display notices providing the public with the location at which aircraft most recently underwent heavy maintenance, as well as the dates of such maintenance. That information would have to be "prominently displayed" on carriers' websites and boarding documents, and airline workers at the ticket counter would be required to communicate it clearly to passengers.

It is not clear whether the requirement would extend to the component level. During an airframe or engine overhaul, parts are removed and sent to many locations—some in other countries. Many are restored to airworthy condition and re-installed on the aircraft or engine. In many cases, the heavy shop performs less work than the component shops, particularly during engine overhauls, which muddies the idea of pinpointing where a specific overhaul is done.

The congressman said the point of legislation is to "create the pressure to force Congress to force the FAA" to take action on oversight deficiencies with foreign aircraft maintenance stations, adding that staffing, budget and resource constraints at the agency have exacerbated the agency's challenges. He said the current system whereby FAA alerts countries ahead of time that inspections will take place provides bad actors advance notice to conceal safety risks from the agency's inspectors.

Speaking candidly, Garamendi said there is a “structural problem” at the FAA posed by the agency’s sometimes contradictory dual mandates of protecting safety while promoting U.S. industry. He suggested separating those two responsibilities, but declined to offer any specifics about what that would look like.

“The FAA has dual responsibility and that dual responsibility is in conflict. The solution relies on separating the responsibilities and giving them to two different organizations; one tasked with safety and the other responsible for the profitability and success of the airline industry,” he said. “We’ve made a choice to allow that conflict to exist within the FAA, which led to 346 people losing their lives because getting [the MAX 8] up and running was more important than getting the issue resolved.”

FAA’s mission once included both ensuring safety and promoting the aviation business, but this was changed via a 1996 congressional mandate. Today, the agency’s stated mission is to "provide the safest, most efficient aerospace system in the world,” its website says.

Its oversight of foreign repair stations—including the practice of providing notice when inspectors are planning mandatory site visits—has come under scrutiny before. Agency officials have explained that, in many cases, they are not permitted to show up unannounced due to local security protocols that are not related to aviation. They also emphasize that their system-safety approach entails examining written processes and procedures that cannot be altered quickly.

Transport Canada bars crews from consuming cannabis for 28 days before flying

Rules would apply to air traffic controllers too

Members of the Canadian aviation industry are forbidden from consuming cannabis for at least 28 days before going on duty, according to new rules now in force.

Canadian Aviation Regulations require that pilots, cabin crew, and air traffic controllers must have a certain level of "fitness for duty" on the job, Transport Canada said Thursday. That means they cannot use or be "under the influence of any drug that impairs the person's faculties to the extent that aviation safety is affected," the agency said.

As such, four weeks is the minimum time required to be free of cannabis before being allowed to work, the aviation regulator said. But the new rules don't preclude airlines or airports from requiring even stricter requirements of their employees.

After the government legalized recreational use of cannabis last fall, Transport Canada undertook a review of its policies with regards to impairment.

The new rules in keeping with what Department of National Defense and the Royal Canadian Mounted Police have come up with for their workers, and "aligned with the best available science," the agency said.

The rules are in place "effective immediately," Transport Canada added.

RECOMMENDATIONS TO PREVENT JET FUEL CONTAMINATION RELEASED

Since 2017, three different instances of jet fuel contamination have led to engine failures in jets, most recently in May when a Citation experienced a double engine failure in flight but was able to land safely.

The industry-led Aircraft Diesel Exhaust Fluid Contamination Working Group released recommendations June 11 for aircraft operators, >

fixed-base operators, fuel suppliers, and other stakeholders to mitigate the possibility of diesel exhaust fluid (DEF) contamination in jet fuel.

DEF is a colorless liquid injected directly into the catalytic converter in diesel engine light- and heavy-duty vehicles in order to meet stringent EPA emission control standards. When mistakenly added to aircraft jet fuel, DEF crystallizes and clogs fuel systems, leading to engine failure.

In three separate and distinct instances at locations in the United States, including Nebraska and Florida, over the past three years, DEF has been mistaken for fuel system icing inhibitors (FSII), a clear liquid that is added to aircraft jet fuel.

“I applaud the industry for working together to promote steps to address this serious risk to pilots, but I strongly believe that DEF needs to be permanently removed from airports. We don’t need to lose any lives over this,” said AOPA President Mark Baker.

After analyzing the events that led to the fuel contamination, the working group found that the DEF container markings were ambiguous and that the containers were often stored near FSII containers. Line personnel, who were under time pressure, mistakenly grabbed the wrong container of fluid. A lack of training and supervision combined with a high turnover rate of line personnel at FBOs and a lack of standard processes, storage, and handling procedures also contributed to the fuel contamination incidents, the working group said.

“The risk of another inadvertent DEF contamination event is too great to not take a concerted, aggressive, and multi-pronged, coordinated approach to prevent another occurrence,” the working group said, calling its recommendations “a good first step but most certainly not the last.”

The recommendations focus on prevention, detection, and response for aircraft operators, FBOs, fuel suppliers, and aviation industry groups.

Additionally, the FAA has made efforts to alert various stakeholders, issuing a safety alert for operators and a special airworthiness information bulletin. In addition, the Office of Airport Safety and Standards sent a letter to airport sponsors providing further background and recommendations.

The report strongly urged "all stakeholders to review this report and use it to review their particular segment of the overall system and make immediate and appropriate changes, once identified, and continually monitor, check, and re-check to ensure the proper processes and procedures are, and remain, in place."

The working group charged industry associations with continued communication and educational efforts with their members and called on the industry to "request an emergency exemption from the rules requiring DEF in on-airport equipment from the EPA." The AOPA Air Safety Institute issued a safety notice to aircraft operators regarding DEF contamination in May.

"The working group members and broader community must and will remain vigilant in monitoring the entire system, reinforcing where needed, and act quickly, if another event unfortunately occurs," the report noted in its summary.

https://www.aopa.org/news-and-media/all-news/2019/may/22/new-def-fuel-contamination-incidents-reported

https://download.aopa.org/advocacy/2019/2019_06_11_Aircraft_DEF_Contamination_Working_Group_Report_FINAL.pdf

https://www.faa.gov/other_visit/aviation_industry/airline_operators/airline_safety/safo/all_safos/media/2018/SAFO18015.pdf

https://download.aopa.org/advocacy/2019/HQ-18-08R2.pdf

https://download.aopa.org/advocacy/2019/190522_DEF_letter.pdf

https://www.aopa.org/training-and-safety/air-safety-institute/safety-notices/safety-notice-diesel-exhaust-fluid-contamination-in-jet-a-fuel

How Batteries Will Power the Next Evolution of Aviation

To certify battery packs for use in electric vertical-takeoff-and-landing (eVTOL) vehicles, companies need data. But, how do you test something that isn't yet happening?

Painstakingly, it turns out.

The first step is to clearly define the mission. Uber knows that whether the application is scooters or air taxis, it is needs batteries capable of performing rideshare missions. That means a lot of repeated, short trips, which tells you a lot about what kind of battery you want, according to Celina Mikolajczak, the battery expert Uber poached from Tesla to act as its director of engineering for energy storage systems.

"This aircraft is very power hungry on takeoff and landing," Mikolajczak said Wednesday at Uber's annual Elevate summit in downtown Washington. "That's a key characteristic of any battery that's going to be flying this aircraft. … It has to have range, too. You have to recharge quickly. ... Fast charge is one of those things that can degrade a battery pack if you don't do it properly."

If the battery falls below a certain threshold, the aircraft can no longer reliably operate and be counted on to get where it needs to go, she said. Another chunk of reserve power should always be held onto for emergencies — ideally, it's unused but can be safely dipped into if something unexpected happens.

Eventually, batteries degrade no matter how they're treated, and Uber will require its powerpacks to function even at the end of their life. It is therefore testing batteries that are near the end of their lifecycles.

The middle of the battery pack — the part between the percentage expected to degrade and the part that will be regularly kept in reserve — is the sweet spot. That portion of battery needs to provide enough range for an aircraft to perform the longest mission it might be called on to perform.

Throughout the day, aircraft batteries will be flying shorter flights and getting in small charging sessions as their schedules allow, but the entire day's operations are expected to stay within that sweet spot. That should ensure a battery's operational standard is repeatable until it is removed from service, but it keep the batteries in operation for as long as possible — a requirement for Uber to meet its margins.

“Every battery, every cell, every chemistry, is going to have a sweet spot where you can use it without degrading it as much," Mikolajczak said.

That pattern is similar to the one her former employer, Tesla, recommends to its drivers to maximize battery life. Rather than discharge until empty and then charge to 100 percent, the companies recommend using full charges for long road trips that need the range. Daily commutes should be done on between 50 percent and 70 percent charge.

More modeling is needed to determine how fast batteries will degrade flying air taxi missions on vehicles that are still on drawing board.

Uber uses a Ragone plot — a chart plotting specific energy vs. specific power. Each point on the chart shows the amount of time for which a certain amount of power can be delivered by an energy storage device. Maximum discharge is required for liftoff while steady discharge is appropriate for other operational phases, including cruise.

Any battery has to have cells packed with material for the structure, thermal management, and to connect things. Creating a battery pack of which 80 percent is power cells is a big challenge, Mikolajczak said, but one she believes is surmountable.

Uber still has a couple battery cells that look like they might be appropriate for eVTOL applications, such as the E-one Moli P42A. At this point, the company starts actual testing. It selects those cells and cycles them over and over to simulate the load they would experience in working conditions.

There's a bit of chicken-and-egg here, because the company needs to both test the impact of the repeated charge-and-discharge while also searching for the most effective charging method. Because it wants the best battery, it starts with something pretty robust: Charging at a 2C rate and discharging as if the vehicle its on is cruising for 25 miles in a 77-degree environment, hitting a peak e-rate during liftoff of 4 and holding a 2.2E rate for 8 minutes, higher than the specifications of most cells. (E rate is a method of measuring discharge rate against watt-hours; a 4E rate would mean quadruple the speed indicated by the rated watt-hours.)

Mikolajczak and her team then checked up on the cells every 400 flights worth of cycles. If the company wants to fly 10 or 12 missions per day, it isn't practical to replace the battery pack every few months, as some were found to require. But, the testing showed that staying within the charging sweet spot provided "substantially better performance," and some tested batteries could last a full year.

Uber has more testing to do. It can refine its next tests further with the data it's now getting — both from this first round of testing and from its manufacturing partners on what their vehicles will require — to continue to probe the limits of the batteries, check additional flight cycles under different conditions and see how they perform in case of failures.

https://www.aviationtoday.com/2019/05/17/what-uber-needs-in-a-vehicle-to-make-its-plans-reality/

FCC Proposes Changes to Aviation Radio Service Rules

The FCC proposed changes to its Part 87 aviation radio service rules to support the deployment of more advanced avionics technology, increase efficient use of aeronautical spectrum and improve aviation safety.

The aviation radio service rules use dedicated spectrum to enhance the safety of aircraft in flight, facilitate efficient movement of aircraft both in the air and on the ground, and ensure the reliability and effectiveness of aviation communications.

The rule changes set forth in the notice of proposed rulemaking (NPRM) would modernize both communications onboard aircraft and by telecommunications stations on the ground that communicate with aircraft, the FCC said.

“The proposed rule changes would help to ensure the timely deployment and use of today’s state-of-the-art, safety-enhancing technologies, such as those comprising the Federal Aviation Administration’s (FAA) Next Generation Aviation System,” the FCC said.

The notice also proposes technical and service rules for the Aeronautical Mobile Airport Communications System, which will enable broadband communications capability to support airport surface operations. In addition, the notice proposes new service rules and rule changes to assist pilots in the detection of objects in degraded visual environments, such as fog, or potential land-based obstructions.

11 Aviation Quotes That Could Save Your Life

When all else fails, follow this advice...

1) Rule number one: no matter what happens, fly the airplane.

2) Aviate, Navigate, Communicate.If you're faced with an emergency, always remember to fly the airplane first, navigate to a point of landing second, then communicate your emergency.

3) When in doubt, hold your altitude. Nobody ever collided with the sky.

4) Truly superior pilots are those who use their superior judgment to avoid those situations where they might have to use their superior skills.

5) Fuel is liquid altitude. The only time you have too much is when you're on fire.

6) Flying, like life, is full of possibilities: can't do...won't do...shouldn't do...

7) It's better to be on the ground wishing you were the air, than in the air wishing you were on the ground.

8) Never let an airplane take you somewhere your mind didn't get to five minutes earlier.

9) Emergency landings are done to save lives, not airplanes.

10) The three most useless things in aviation are runway behind you, altitude above you, and fuel not in your tanks.

11) There are old pilots and bold pilots, but no old, bold pilots.