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If Human Error is the cause of most aviation accidents, then shouldn't we remove the human ?



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Outline



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- Human error accident rates
- Examples of human error accidents
- Examples of human safety contribution
- Conclusions



Global Pilot Error Accident Rates

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During 2004 in the United States, pilot error was listed as the primary cause of 78.6% of fatal general aviation accidents, and as the primary cause of 75.5% of general aviation accidents overall. For scheduled air transport, pilot error typically accounts for just over half of worldwide accidents with a known cause.

Total pilot error

The total of all three types of pilot error (in yellow). Where there were multiple causes, the most prominent cause was used.

Other Human error

Includes air traffic controller errors, improper loading of aircraft, fuel contamination and improper maintenance procedures.

<u>Cause</u>	<u>1950s</u>	<u>1960s</u>	<u>1970s</u>	<u>1980s</u>	<u>1990s</u>	<u>2000s</u>	<u>All</u>
Pilot Error	41	34	24	26	27	30	29
Pilot Error (weather related)	10	17	14	18	19	19	16
Pilot Error (mechanical related)	6	5	5	2	5	5	5
Total Pilot Error	57	56	43	46	51	54	50
Other Human Error	2	9	9	6	9	5	7
Weather	16	9	14	14	10	8	12
Mechanical Failure	21	19	20	20	18	24	22
Sabotage	5	5	13	13	11	9	9
Other Cause	0	2	1	1	1	0	1

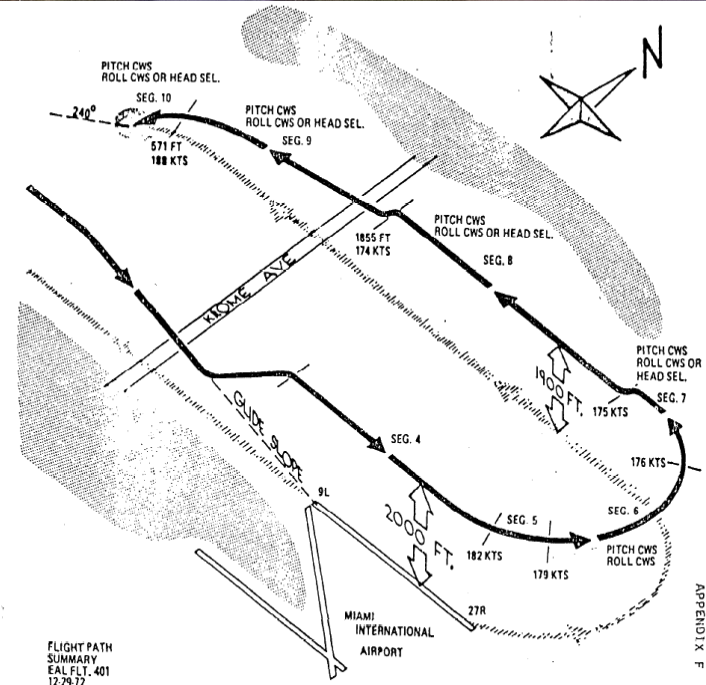


1972: Eastern Air Lines Flight 401



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- Lockheed L-1011-1 Tristar jet crashed into the Florida Everglades on December 29
- Fatalities – 101 (all)
 - Second Deadliest Crash in US
- **CAUSE:** Entire flight crew was preoccupied by a burnt-out landing gear indicator light and failed to notice the autopilot had inadvertently been disconnected. Resultantly, the flight gradually lost altitude and eventually crashed while the flight crew was distracted with the indicator problem.





1989: Varig Flight 254



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- On September 29th prior to take off from Marabá in Brazil towards the final destination, the crew of the Boeing 737-241 entered an incorrect heading into the flight computer and flew west ending up over a remote area of the Amazon jungle.
- Fuel starvation occurred.
- The pilot made a belly landing in the jungle 1,050 miles northwest of Rio de Janeiro. The survivors were rescued two days later.
- Fatalities = 13 out of 54 with 34 major injuries
- **CAUSE:** Pilot error in reading the correct heading from the flight plan by the commander.
 - This was compounded by the co-pilot copying the setting from the commander's panel instead of checking the flight plan.





2005: Helios Airways Flight 522



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- On August 14th, a Boeing 737–31S flight crashed into a mountain in north of Marathon, Greece.
- A lack of oxygen incapacitated the crew, leading to the plane's eventual crash after running out of fuel.
- Fatalities = 121 (all)
- **CAUSE:** Non-recognition by the pilots that the pressurization system was set to "manual mode, leading to crew incapacitation, and eventual fuel starvation.





1999: LAPA Flight 3142



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- On August 31st a Boeing 737-204C crashed while attempting take off from Jorge Newbery, Argentina after it failed to get airborne.
- Aircraft overshot runway, breaking through airport's perimeter fence, crossed a road, hitting a car, and finally collided with road-construction machinery and a highway median. Fuel spilling over the hot engines and gas leaking from a damaged gas regulation station resulted in a fire that totally destroyed the aircraft.
- Fatalities = 65 out of 105
- **CAUSE:** Pilots forgot to extend the wing flaps to initiate take-off, and ignored the alarm advising them of the error in configuration for take-off.





Implications ?



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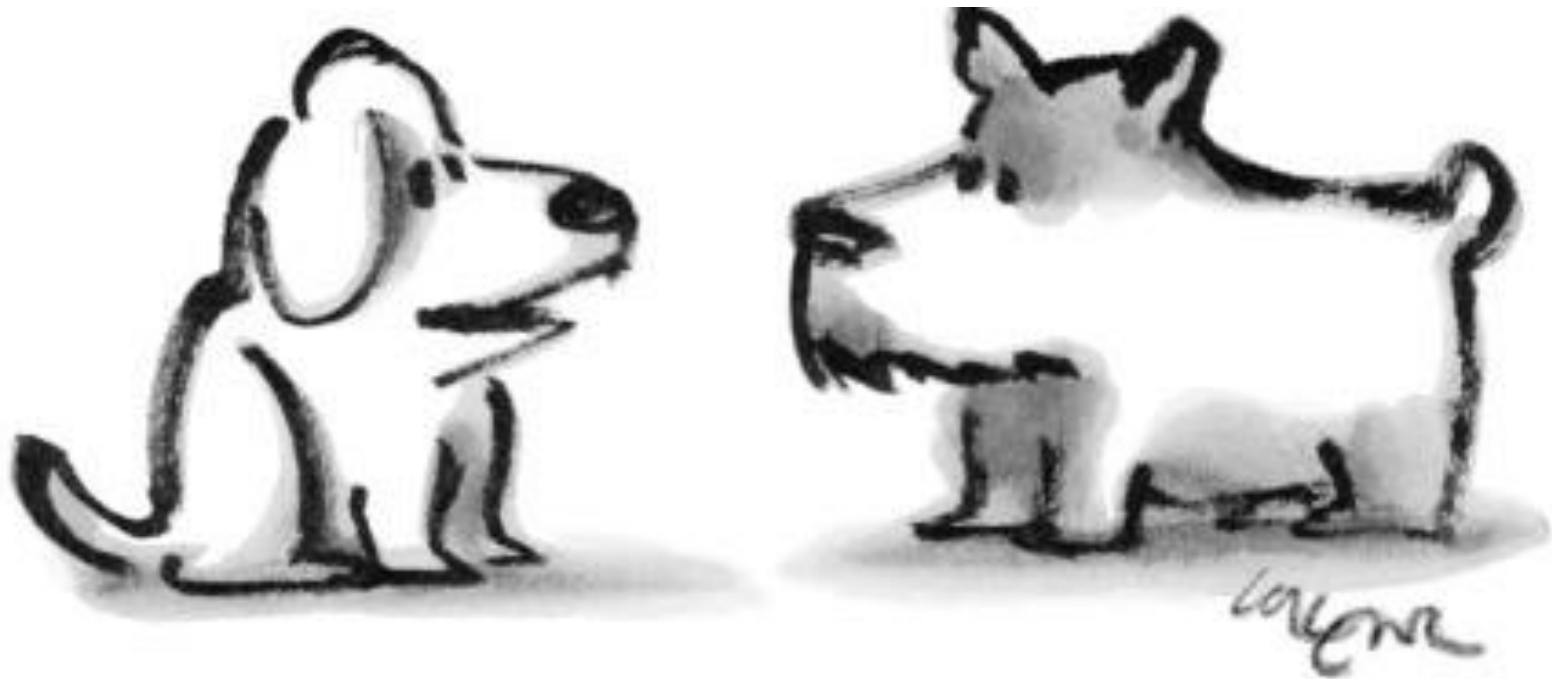
- If we stop here, the implication is to take the human out of the loop
- Automate everything possible
- But,



Human Error or ?



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*"I attribute it to human error. But then I attribute
everything to human error."*



1982: British Airways Flight 9



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1982: British Airways Flight 9

- 24 June, a 747-236B. The aircraft flew into a cloud of volcanic ash from eruption of Mount Galunggung
- All 4 engines failed
- High Indonesian mountains needed to be crossed to land at Jakarta.
 - Crew decided that if the aircraft was unable to maintain altitude by the time they reached 12,000 feet, they would turn back out to sea and attempt to ditch into the Indian Ocean.
- After several attempts all engines were successfully restarted
- NO CASUALTIES

“Ladies and gentlemen, this is your captain speaking. We have a small problem. All four engines have stopped. We are doing our damndest to get them going again. I trust you are not in too much distress.” - Captain Eric Moody

Source: <http://www.reuters.com/article/2010/04/15/us-europe-air-jumbo-volcano->



2003: Baghdad DHL attempted shoot-down



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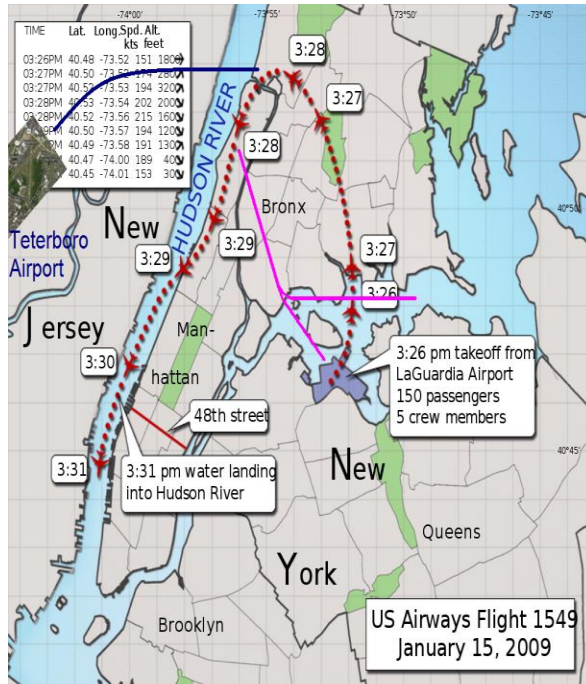
- November 22, shortly after takeoff from Baghdad, Iraq, an Airbus A300B4-200F cargo plane operated by DHL was struck on the left wing tip by a surface-to-air missile at 8,000 ft.
- Severe wing damage resulted in a fire and complete loss of hydraulic flight control systems.
- The 3 man crew made an injury-free landing of the crippled aircraft, **using differential engine thrust as the only pilot input.**
 - This is despite major damage to a wing, total loss of hydraulic control, a faster than safe landing speed and a ground path which veered off the runway surface and onto unprepared ground
- NO CASUALTIES



2009: US Airways Flight 1549



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- January 15, the Airbus A320-214 struck a flock of Geese during its initial climb out which resulted in an immediate and complete loss of thrust from both engines
- Despite ATC vectoring them back to LaGuardia or Teterboro, the Pilots knew they would not make it to either, and decided to ditch in river.
- Ditched in the Hudson River off midtown Manhattan impacting water at 130 knts
- NO CASUALTIES



What does this tell us ?



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- Should allow hero pilots to fly, but eliminate others
- Design interfaces with human capabilities and frailties in mind
- Optimize human contribution



“Airing of the Grievances”



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- Program Managers
 - Hold accountable for system performance
- Automation Engineers
 - What can we automate ?
- Human Factors
 - It depends.