FLYING LESSONS uses recent mishap reports to consider what might have contributed to accidents, so you can make better decisions if you face similar circumstances. In almost all cases design characteristics of a specific airplane have little direct bearing on the possible causes of aircraft accidents—but knowing how your airplane’s systems respond can make the difference as a scenario unfolds. So apply these FLYING LESSONS to the specific airplane you fly. Verify all technical information before applying it to your aircraft or operation, with manufacturers’ data and recommendations taking precedence. **You are pilot in command, and are ultimately responsible for the decisions you make.**

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**This week’s LESSONS:**

**We usually** think of “fixation” as referring primarily to instrument pilots, and then to the phenomenon of focusing on one instrument to the exclusion of others when flying without outside references, missing vital information or even losing command and control of the aircraft as a result.

**There are other types** of fixation, however, that can apply to visual and instrument flight alike. Just as in the typical discussion of fixation, these too can result in loss of command and ultimately loss of the aircraft and its occupants. Consequently, we need to be aware of other types of fixation that we must watch for and guard against in ourselves. Let’s look at a couple of “nontraditional” fixation events, which despite being somewhat extreme may help reveal the larger threat of fixation in all our flying.

You may have seen [this video](https://www.youtube.com/watch?v=O2KCYhULWZ8) of a firefighting aerial attack Avro jet (caution: there’s some foul language from the videographer at the end). Watch especially the final seconds of the video after the modified Regional Jet has dropped its load of fire retardant and begins the pull-up from the target area—watch its shadow and the effects of its wake turbulence close to the ground. The jet barely misses a high-speed controlled flight into terrain (CFIT).

**Apparently** the RJ85’s crewmembers were so intent on placing the retardant accurately on the target zone—fixating on that goal, even—that they did not project the flight path beyond the drop zone and alter it as necessary to avoid coming extremely close to catastrophe.


**A second case**, describing a different type of fixation, comes from the Australian Transport Safety Bureau:

The preliminary report details factual information established in the investigation’s early evidence collection phase, including the accident’s sequence of events derived from the aircraft’s track and altitude, information determined from examining the wreckage and impact site, and weather details.

The Cessna [404 Titan] had departed Cairns at 7:19 am for a planned same-day return charter flight to Lockhart River. The forecast weather for their arrival at Lockhart River was for overlapping periods of rain and low cloud with possible thunderstorms. ATSB investigators were able to build an understanding of the aircraft’s flightpath using transmitted GPS data recorded at five-second intervals by an electronic flight bag.
application on the pilot’s iPad. That data showed that the pilot was conducting an area navigation (RNAV) GPS instrument approach to try and land at Lockhart River. For vertical navigation the pilot was using a combination of altimeter and GPS distance information.

When the aircraft was about 30 km from Lockhart River, the pilot joined the approach and followed the procedure down to the missed approach waypoint. The pilot continued to track to the runway and operated below the minimum descent altitude (MDA) for a short period until the pilot initiated a missed approach. The aircraft climbed to 3,500 feet and tracked for a second GPS approach. Halfway along the [second] approach, the aircraft descended through the minimum safe altitude of 1,800 feet for that segment. About 30 seconds after the final approach fix, the data shows the aircraft nearing 700 feet with an apparent decrease in the descent rate for a short period. The aircraft then descended below the minimum descent altitude and diverged to the left, crossing the inbound track at an angle of about 20°.

Tragically, the descent continued until the aircraft impacted a sand dune on the coast, fatally injuring all on board.

Both engines were operating normally with substantial power on impact and the landing gear was extended. There was no evidence of any structural or mechanical defects with the aircraft [prior to impact].

The full Preliminary Report is available here.

It could be that the pilot of the big Cessna twin was so intent on getting his passengers to their destination—so goal-fixated—that he knowingly flew “just a little lower” on both approaches, and “just a little farther” on the second approach, in an attempt to meet his goal.

See:

We see similar examples of apparent goal fixation in the mishap record with great frequency. Pilots wishing to impress observers on the ground make a low altitude, high-speed pass and pullup (in defiance of 14 CFR 91.119)—what I call the “airshow pass”—end up stalling the airplane or sometimes overstressing it and losing structural integrity as a result of “rolling Gs.” Of course some of the most persistent accidents causes, from loss of control in flight (LOC-I) including stalls and spins, fuel starvation and exhaustion, and gear up and gear collapse mishaps, have causes rooted in pilot distraction…which may be the result of putting too much focus on the immediate goal, and not thinking enough about what will follow.

See:
https://www.ecfr.gov/cgi-bin/text-idx?c=ecfr&sid=3efaad1b0a2594de4911505a34d1aa77&rgn=div5&view=text&node=14:2.0.1.3.10&idno=14#se14.2.91_1119
https://www.aviationsafetymagazine.com/features/yanking-and-banking/

Obviously there may have been other factors at play that are not apparent in the RJ85 video or the ATSB preliminary report. But my first instrument instructor’s voice still rings in my head, prompting me to be constantly thinking, “what happens next, and what happens after that?” Instruments or visual, we should all apply my instructor’s wisdom to avoid goal fixation.

Comments? Questions? Send them to mastery.flight.training@cox.net

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Debrief: Readers write about recent FLYING LESSONS:
Reader Rick Baron writes about last week's LESSONS, on the need to practice to develop muscle memory to adapt to the unique designs of various aircraft:

Before I had low back issues I played a lot of golf. And after work if I didn't have time for a round I'd spend time on the range hitting golf balls. The range is not the same as playing the game but the practice of doing something over and over better allows that motion to be retained when the pressure is on, as you said in your article.

If I don't have time to fly or have no place in particular I want to fly to, I'll go out and do landing practice. I'll have a mission goal each time such as not putting the nose down too soon after the mains touch, increasing my aileron input as I slow in a crosswind, power off 180's, go arounds prior to touch down, etc. Again, the idea is to have these repeated often enough that if and when the time comes and the pressure is on our brains and muscle memory take over and nothing is forgotten.

We all like to think that once it's learned it's retained, but sadly that's just not the case.

That's' why there's a whole industry built around recurrent training for pilots who fly more than almost all of us. That alone is a LESSON for pilots who are not flying every day to consider. I've also always prescribed to the same idea as you, that even "routine" flying is an opportunity to practice the basics and aim for precision and mastery—even a Saturday morning pancake run presents the chance to practice two specialty-style takeoffs and landings, precise speed control in all phases of flight, and accuracy on altitudes and headings. Thanks, Rick.


Career flight instructor and frequent Debrief Dan Brindle adds:

As you know I have been working with some of the Kolb homebuilts. My current test flying experiences in the FireFly with the longer wingspan has brought to my attention several “gotchas” that could be very entrapping for conventional “certified” pilots. Most certified pilots may conclude that a mere 28 horsepower ultralight should be within their existing piloting proficiencies.

For a beginner, not yet contaminated, with learned, certified pilot muscle memories, the FirFly can be great primary trainer if our discussions/experiences, include comparing the “high line of thrust, pusher” influences, and the tail wheel influences, with front engine tractor/puller, tricycle gear current muscle memories of current certified pilots.

As a “primacy” guy in the Cessna 120, you would be comfortable with the tail wheel. But this FireFly high line of thrust produced some interesting learning experiences for me! Think about an airplane rigged for a high line of thrust. Any conventional, certified pilot could expect, in the experience of a loss of thrust, a pitch down, glide behavior from the conventional airplane. But loss of thrust, from an airframe rigged for a high line of thrust, will respond to a loss of thrust with a pitch up behavior. Or the other extreme, during landing, at slow speed, about to land, a critter on the runway, applying full power to go around will [the aircraft] pitch down, in a lawn dart behavior!!

Just as an aircraft pivots around it’s center of gravity, it will also pivot around a center point along that aircraft’s waterline (a horizontal line passing through the center of mass of the aircraft) if the source of the thrust is offset from that waterline. Imagine adding power in the drawing and you might be able to visualize how that would cause the nose to rotate downward. Reduce power during landing, or lose thrust in any phase of flight, would cause the nose to translate upward, increasing angle of attack in the process. Both of these motions are opposite the aircraft tendencies we find in most aircraft we fly; both are detrimental to what’s needed in those situations, requiring active and proper pilot intervention.

Knowing this, and being ready and able to instinctively compensate for the adverse motions of power increase or power reduction, requires substantial practice to unlearn what was previously learned. This was the LESSON of the new normal when transitioning to an aircraft that’s new to you. Thanks, Dan.
Reader Bill M. (his email didn’t contain his last name) chimes in about the May 28th LESSONS on takeoff phases and “listening to your airplane”:

My first flight as a private pilot in a Cessna 152 was interesting. Not long after takeoff the engine power decreased. Nothing dramatic, but a noticeable loss of power. I returned to the airport and landed. Did a run up, everything sounded good. No magneto check done. Tried another take off, aborted that. Tried one more which was aborted, then headed back to the flight school.

An older, grizzled mechanic came out to check. The engine started right up, he ran it at full power, gave me a long glare, then he did a mag check and the engine quit cold. He grunted, slammed the door and walked away. At first I felt like I was the person wrong, the power loss imagined. When that engine quit, it was such a relief.

I learned a lot from the experience. Now as a CFI/II/MEI and Bonanza owner, I still remember that experience and try and pass it along. Airplanes do talk to us, we just have to learn to listen and act.

No one wants an airplane to fail to perform…except when we report a problem to a mechanic! Thanks for validating the experience, Bill.


Reader and airline pilot Dan Drew continues the theme, as well as a callback to this week’s LESSONS about fixation and adding to the Debrief discussion in last week’s issue about stepping in on the radio to help a pilot in distress (or at least one who is obviously fixated to the point it impacts performance):

Full confession mode here…and it was over thirty years ago. I was right seat on a DC-9-30 flying out of Midway Airport in Chicago. I had been a Captain on DC-9s at a previous but now defunct airline and had about 4000 hours in both seats. Midway is short and has concrete walls built around the field. I don’t remember where we were headed but the Captain was a retired Navy pilot and very experienced and easy to fly with.

We started the takeoff roll and just slightly prior to V1 decision speed I called out “We’re losing number one,” and then “No, it’s coming back”. Both of our attentions were diverted to looking at that stupid gauge and we couldn’t feel much in the yaw (basically [there’s] an almost centerline thrust vector in the -9). By this time we were past V1 and yes I know my ONLY callout should have been, “We’re losing number one… reject.” But it was just a momentary blip.

I called out “Rotate” and we did, and the engine rolled back [lost power] again only to surge back up to full power. We were both fixed on the engine gauge and had let our normal procedures drop until someone on the ground called out on the frequency “Gear UP.” That slap in the face woke us up and we went into our normal engine-out mode and declared an emergency.

We went out over Lake Michigan and started taking care of the airplane. Not germane to this story is that we determined that if we left the engine at idle or slightly above it wouldn’t over temp and we felt like some thrust was better than nothing. We went back [to Midway] and landed. Two highly experienced DC-9 pilots with a combined time of 20,000 hours and probably 10,000 in the -9 alone, and we both said “We have never had an engine failure before…but since it didn’t fit the simulator BANG [scenario we were used to] we were both shocked that it was really happening until an unknown friend spoke up and told us “Gear Up.”

Turned out to be a bleed valve failed fully open was we were trailing smoke, fuel, and a little fire out the tailpipe.

Offering help is a sensitive subject but sometimes it is very helpful. If not needed or wanted, then the pilot can just tell them to pound sand.

There is also the case of a pilot asking for help but no one can give it. One very stormy night flying from Houston to Dallas and busting the same line of weather for the fifth time that day, a young kid in a Baron canceled check-runner called Fort Worth Center in the area just between Fort Worth and Houston Center. He was low so no one could see him on radar. We were getting bounced pretty good at altitude and this poor guy was screaming he was in extreme turbulence, rain and lightning, asking for vectors to any airport. And the controller said, “I can’t see you.” The kid came back and said, “I think I am inverted,” and the controller did the only thing he could do: he said “Ride ‘em, cowboy.” We all felt helpless but not knowing his position we could not help, and too many words would not have helped.

He did pop out in about a minute and told the whole world (the controller had him on radar by then) that he wanted a vector to any airport, and he was quitting.
Scary stuff, Dan. Thanks for relating it.


Questions? Comments? You know the drill: mastery.flight.training@cox.net.

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