SOARING Rx

BY DR. DANIEL L. JOHNSON

I have two points today.

1: To encourage you to *weigh your tail dolly*, measure its location, and run a weight-and-balance calculation for your glider as normally loaded *with the tail dolly in place!*

This will tell you where to expect the CG to be located in case you do the humbling thing, and will help you understand, before it happens to you, how to respond. However, I can assure you: *if you can take off* with the thing in place, *you can fly* with the thing in place – only, not on the edge of stall!

2: To remind you that you have the power to panic others. What you say, in a crisis, may distract or frighten another and hinder a safe response. We should rehearse for emergencies, not only what to do, but *what to say*, to succinctly elicit both understanding and calm response.

To repeat: in a crisis, be careful to ensure that what you say leads others to do something safe.

While driving the tow truck for a ground launch, Dan saw the ground-launch rope go slack as Paul released, quickly pulled his own release to avoid dragging the rope around runway lights, spun the truck around in the grass overrun, and looked up at the Lark. They were using the 3500-foot north-south runway, getting only about 700 ft agl on each ground launch. Enough altitude to practice patterns and landings. Paul floated slowly past overhead, and banked to turn crosswind. Yikes! The tail dolly was on!

Dan thought, How should I say this? He keyed the handheld. He said twice, as clearly as possible, "Papa Romeo, keep your speed up! You have the tail dolly!" He quickly drove to the other end of the rope, clipped it to the tow hook, and back-dragged the rope into place for the next tow while Paul flew his pattern. He came in fast, did a wheel landing, and when the dolly's castering wheel touched the runway, it oscillated terribly, creating a thunderous aluminum din.

The retrieve crew towed the glider back to the launch point, and everyone inspected it and the dolly carefully. No damage of any kind was visible. They debriefed. Paul said, "The glider flew well. I didn't notice a problem until the dolly touched the runway. Wow! My ears are ringing."

Jimmie said, "I'm sorry. I should have seen that."

Dan said, "I'm sorry. I should have reviewed the checklist with you."

Paul said, "I'm sorry. I didn't get a visual on the tail dolly off to the side." Apologies all around.

They had rotated positions just before the flight; earlier Dan was the wing-runner, Jimmie the tow driver; they now realized they hadn't followed their usual launch-prep sequence because of an interruption.

At the other end of the country, in the same month a year later, Grampa, a CFIG, climbed into the rear seat of the club Lark while someone strapped his daughter-in-law into the front seat and put her little daughter on her lap.[1] He was experienced and skilled. The previous flight was with his son and unbelted grandson in the front seat. The rides were a wonderful gift.

They launched to the south on the grass runway. The aerotow began smoothly. When Grampa was out of ground effect behind the accelerating tow plane and beginning to climb, the radio crackled. The launch director's voice cried, "*Abort! Abort! Abort!*" Grampa didn't know what the problem was, but it must be serious!

Both Grampa and the tow plane released, and the rope dropped. The stick moved against his hand, and the glider kited up. Had the grandchild grabbed the stick? He pushed it forward. He now had enough altitude to bank – about 150 ft – and began a level right turn to land on the runway behind. Suddenly, the controls went slack. The glider banked; its nose dropped. It plummeted into the field; its nose and cockpit crumpled.

All three were killed. What happened?

This is not an accident analysis!

I want to focus on a single feature of this incident: Several people noticed, as the glider launched, that the tail dolly was not removed. They told the launch director, who gave the order to abort. What might have been the effect of this order, on the subsequent flight problems, and on the pilot?

Same model of glider, same equipment problem. Why did one flight end successfully and one end in death? One reason might be *Panic.* Who panicked? The spectators, then the launch director, then the pilot of the glider. Why do I infer he panicked? Because in a crisis, he responded inappropriately, a symptom of panic.

It's hard for me to say this, because it may grieve people. *The initial probable cause of this fatality was the panic of the spectators, then of the launch director.* This resulted in the pilot being given a gratuitous and wrong *command.* The only safe way to handle such a distressing situation is to describe for the pilot *what's happening.* Let the pilot in command make the decisions. We should say nothing that might distract or scare the pilot in command! (PIC)

For example, at another airport, a different time, a glider pilot on low, fast, final at about 40 ft agl suddenly encountered a 35-kt thunderstorm gust front, creating a crosswind, which he'd seen approaching. This distracted him, of course, from the mundane cockpit routine. The bottom of the fuselage was shiny-smooth. We spectators felt our hearts drop. However, one person had a handheld; he instantly shouted one word: "*GEAR!*"

The wheel dropped out, the glider paused in its descent, crabbed into the gust, and landed safely. The pilot was given information, not a command.

Many, many years ago, I was a medical student assisting in surgery. One of the most important lessons the surgeon pressed home was that anything anyone said might distract the surgeon from correct action.

Yes, several mistakes were made in this fatal flight, yet a key mistake was the apparent panic of the spectators and the launch director – club members and friends – who, like most of us, may have falsely believed that flying with the tail dolly attached is perilous.

The abort order was exactly the wrong thing to say, at the worst possible time.

It was the wrong thing to say because it was not an explanation of the problem, and because it was merely an alarm, which will de-focus the pilot's attention into a scan for unknown trouble at a time when focus is crucial. It came at the worst possible time because the glider was lifting off, near the end of a short runway, without altitude to recover from a release. A time for an "abort!" or "release!" order is before the glider begins to roll.

Research with automated aircraft instrumentation has shown that fewer pilot errors occur with "status-driven" displays than with "command-driven" displays. That is, if pilots are told *what's happening* (status), they can make reasoned decisions about a response, bearing in mind the context of the current flight situation. If pilots are ordered *to take an action* (command-driven), the lack of explanation precludes any possibility of rationally adapting their response to the context of the flight.

"Abort" is "command-driven;" "tail dolly attached" is "status-driven." This is the main difference in these two incidents.

The time for panic would have been when someone, anyone, realized that there would be a lap child. I remember once allowing a child to sit upon my lap in a glider on the ground, who said, "Grampa, can I ride with you?" The thought was terrifying: all I could think of were arms and legs hitting controls. I guess it's my built-in pessimism, so important for safe doctoring and aviating, always assuming the worst really might happen.

As with most serious accidents, there were also some technical mistakes: Why did the glider kite when it should have flown level off the end of the runway into the cropland straight ahead? Control interference by the child? A decision to climb for altitude? It began a level turn after climbing to about 150 ft. Was this the beginning of the fatal stall, or was the pilot trying to turn back?

Yes, a Lark can perform a 180-degree turn at 150 ft, but it has to be well above stall speed, probably faster than this one was after zooming 50 or 75 feet.

Sadly regarding a possible decision to turn, this grass strip is completely surrounded by flat farm fields, with no obstructions in the direction of this takeoff. Landing straight ahead or to either side would have damaged only crops.

Likely, there was lost airspeed awareness, incurring the fatal stall-spin. Below redline airspeed, *speed is our friend.* As we have discussed in an earlier essay, when the airplane is close to the ground, *all airspeeds seem fast*, including stall speed, because the nearby ground seems to be rushing by.

What difference is there between fear, anxiety, or hypervigilance – and panic? It's that with panic, the fear leads to *irrationality* and bad choices.

The roots of this word are in Greek mythology. Apparently, when the god of shepherds, Pan, was (for example) rudely awakened from an afternoon nap, he might scream at the sheep and goats, who, frightened, would crash mindlessly through the brush: *panikon diema* time. Panic.

Flying with a tail dolly.

Why do we think that taking off with a tail dolly is a catastrophe? Because we

haven't done the math. How much does it really change the center of gravity? (DG)

I did a little calculation. The tail dolly that Dan, Paul and Jimmie were using weighed at least 6 kg (13.5 lb). The tail dolly on the fatal Lark appears smaller.

The minimum front-cockpit weight of the Lark for solo flight is 70 kg (154 lb.) With the rear-seat occupied, there is no minimum. Maximum weight of occupants is about 185 kg – 400 lb.

The distance (moment arm) from the CG to the center of the dolly is about 4 meters (403.7 cm); the distance from the CG to the center of the front-seat occupant is 179 cm.

The ratio of these moment arms is 2.25, so –

If the tail dolly weight is:

CG shifts as if the weight of the front seat occupant is this much lighter:

Revised minimum front-seat weight for solo flight becomes:

5 kg = 11 lb.
11.25 kg = 25 lb
81 kg = 180 lb.
6 kg = 13.5 lb.
13.2 kg = 30 lb.
83 kg = 185 lb.
8 kg = 18 lb.
17.6 kg = 40 lb.
92 kg = 195 lb.

The accident Lark, with tail dolly attached, was after the accident estimated to be near the middle of its CG range, and over gross. Its flight characteristics would have been normal. The CG was clearly within limits in the non-fatal incident, since I know Paul's weight.

As an alternative example, I weighed the dolly for my Ventus. It's 4.2 kg (9.3 lb.). The tail-fin tank is built to hold up to 2 kg (4.4 lb) of water, and is about 2 feet aft of the tail dolly's position. The 5-pound difference isn't trivial, but won't make the elevator ineffective at any reasonable airspeed. Not that I'm going to test-fly that configuration, but if I do the dumb thing, I know that I don't have to die.

Handling the Scary Takeoff

In any case, if a glider begins taking off with equipment attached, there is no reason for panic. Aside from the fact that panic is inherently unreasoning and dysfunctional, the PIC is the only person who is in a position to know whether to continue or abort the takeoff when the problem is discovered, and should be the only person making a decision about what to do next. And the pilot is the only person who can feel what the glider's doing.

First, if the glider responds strangely to the controls, we pilots will normally pull the release without first exploring why. Analysis follows action. So does embarrassment.

Second, if the tail comes alive nicely, and the glider lifts off and is controllable, it is going to fly just fine! Only, we don't push the airspeed envelope, do we? We keep it fast enough for maintaining a good control feel.

Panic and decision making.

First, you won't be surprised to know that panic happens in the brain. We even know just where. *"Anterior cingulate activation in high trait anxious subjects is related to altered error processing during decision making."* or, to put it another way, *"The anterior cingulate cortex has been implicated in the detection and processing of errors."*[2] (It's in the center of the brain. This is today's jargon treat.)

OK, now that we're clear on that, we can move on to more basic facts.

It's well known that the best antidote to panic is *training*. When an emergency develops, people do what they've been trained to do. If they haven't been trained, they do nothing at first, then something arbitrary (there's no time to do a courtroom analysis!), and often, something totally irrational.

Panic is contagious. When one person panics, others tend to also. This is why entire armies may turn and run.

Fatigue and stress impair decision-making ability. "...every individual will panic earlier than normal if he is suffering from fatigue, illness, worry or anger. But, even well away from the panic threshold, good judgment is seriously impaired under stress..."[3]

Panic is long-lasting. Impaired cognitive function has been seen to persist for 2 or 3 days in soldiers who have experienced life-threatening battlefield stress.

People who are exposed to uncontrollable stress make decisions prematurely, before considering all the alternatives – *unless they have been trained.*

At the same time, decision-making always involves risk. Prudence involves a thoughtful consideration of risk, and planning to adapt to it.

Anxiety is more than a mood.

As a mood, anxiety is basically a mindset that "trouble might happen." Anxiety is normal and useful. Fear is an emotional response to a sense of a threat. It is not usually helpful except as a motivator to get out of trouble.

Anxiety affects thinking. Mild anxiety sharpens us; severe anxiety tends to fixate our minds and hinder us from considering all the possibilities. "Cognition" involves attention, memory, and problem-solving; each of these aspects of thinking may be enhanced or degraded, depending

on the intensity of our anxiety response to the stress we face.

Mild anxiety hones thinking and arouses attention. On the other hand, we need to learn self-calming skills for use under more severe stress, because intense anxiety makes us narrow and dull, and may degenerate into panic. Having a plan and training, and using this – even if it's as simple as "wings level, airspeed in the green arc," will help restore calm and allow the brain to explore for a solution.

Anxiety affects us physically. Our pupils dilate, blood pressure increases, heart races or pounds, breathing speeds up; we sweat; our muscles feel shaky (they're being primed for action); our gut slows.

These changes can themselves make us feel frightened or self-conscious, which will distract us from the crisis that needs a response.

The important thing is to accept these responses as significant and safe, a signal that our body is preparing to help us respond to whatever demands the situation may create.

Assess Ourselves First

Can we manage our anxiety and avoid panic?

First, we must understand ourselves. Each person is differently susceptible to anxiety. We all know that some people are pathologically free of anxiety – the "no fear" person who keeps getting injured or endangers others; other people are pathologically anxious, sometimes unable to take normal risks.

Some of this is built in. My wife, an OB nurse, often remarks that babies show personality differences right out of the womb. Some cuddle, others are stiff. Some are calm and imperturbable, others are easily frightened.

Our formative years modify this. Some of us were taught to manage our own risk and anxiety; some of us had experiences that amplified anxiety, or we were taught by example to be anxious.

Many people have had emotionally traumatic events that have created specific anxieties – an assault, a rape, a firing, an accident – and a trauma (scary event) during flight can trigger panic in a later similar situation. (My daughter loved to fly until she rode in a commercial jet into a severe thunderstorm.)

What creates trauma in a frightening event, what imprints it in our brain, is that we *feel* threatened – whether or not the event is actually dangerous. If we learn afterward that there was no danger, we can replay the event in our minds, using this knowledge to quiet ourselves each time we relive it. This mitigates the emotional injury.

Last, we need to prepare for frightening events by imaging them and rehearsing our response. We can do this for ourselves, or can arrange for training. We regularly rehearse standard emergencies in pilot training – but this is only a selection of the many possibilities. It's always useful, while sitting beneath a tree and admiring the sky, to rehearse a task in our mind, one step at a time; and at each step try to imagine all the crazy, stupid, or catastrophic things that could happen – and plan how to handle each.

We do this, of course, imagining ourselves as PIC. However, it's also important to daydream like this about things that we observe. The instructor is safer who imagines mistakes the student might do; the field safety officer who imagines what

might go wrong – and what to do or say in response!

The repertoire of actions that we build from these mental exercises must include *silence* and *inaction*. The simple truth is that the observer can induce panic in the PIC with one word, like crying 'fire' in a theater. Alternatively, we can create a distraction with an unneeded warning.

For example, the PIC has seen and is monitoring potential conflicts in a busy traffic pattern. The daydreaming passenger suddenly notices one of these conflicts, and shouts, "Look out!" This warning utterly devoid of useful information, distracts the pilot from a safe scan and thus can cause an incident.

You've probably had this happen while driving. A dicey traffic situation develops; you steer away from trouble. The slight jerk interrupts your passenger's daydreams, who shouts, "Look out!," taking your focus from the situation to scan for a new threat.

Anxiety Spectrum Disorders

Anxiety, fear, and panic are different intensities of emotion in response to concerns. It is a *normal* thing to experience any of these. A *disorder* occurs when the emotions hinder our function. Psychologists have defined a range of conditions in which anxiety is heightened and makes us less able to function. These include depression, phobias, panic, obsessive-compulsive disorder, generalized anxiety, autism and Asperger's, post-traumatic stress, and other conditions.

Please, if you have one of these conditions, examine yourself honestly and ask, before each flying activity, what exigencies and responsibilities you are prepared for.

To sit and think about mistakes and catastrophes may not fit your usual topics for meditation, but doing this regularly can be lifesaving.

Interesting reading

The Art Of Failure: Why Some People Choke And Others Panic. By Malcolm Gladwell.

http://web.archive.org/web/20030420152721/http://www.gaelicgazette.com/artoffailure.htm

(Google the title; type the url only if a search fails) He uses examples involving tennis, golf, and JFKjr.

Acknowledgments

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Endnotes:

[1] To find the NTSB accident report, Google site: ntsb.gov "CEN12FA378"

[2] This has been today's jargon treat, from Anterior cingulate activation in high trait anxious subjects is related to altered error processing during decision making. Martin P. Paulusa, Justin S. Feinsteina, Alan Simmonsa, Murray B. Stein. Biological Psychiatry, Volume 55, Issue 12, 15 June 2004, Pages 1179–1187. For the anatomy, search for images of cingulate gyrus.

[3] Dr. Claudius Carnegie – cacarnegie@msn.com http://www.allstar.fiu.edu/aero/HumFac05.htm