

Flight Test Safety Fact



Published for the Flight Test Safety Committee

In This Issue

Reader Feedback – A reader crashed his hang glider & has thoughts on *Lucky or Good?*

Turbo Talk – this month a different kind of column from a different kind of President

Recommend our Podcast: listen—subscribe—recommend—keep listening—repeat.

Reader Feedback: Lucky or Good

Dear Mark,

In July of 1995 I was out with a crew conducting production flight tests on hang gliders for our company, Wills Wing. We were using a time saving technique where we used thermals to climb to the top of the mountain from which we had launched and land there, thus saving the long drive back up from the normal landing area in the valley. The top landing was challenging – you had to be precise in the approach or things could go very wrong very quickly. On one of my landings that day things did go very wrong: I lost control of pitch and roll in strong turbulence just prior to landing flare and only partially recovered before I hit the ground very hard. In the end, I was not seriously injured, but the landing shocked me, because I'd been doing this same landing 100 times a year for each of the prior 15 years, and I'd never had a bad landing before. Thinking about the incident over the ensuing weeks, I was unable to find any errors I had made in skill or technical execution, which eventually led me to the conclusion that the cause had to have been an error in *judgement*. Twenty years later, the continued accumulation of thoughts about the accident and its implications for the relationship between skill, judgement and good fortune on safety led to the presentation of a paper to SETP. I'm still thinking about it and what follows are some thoughts inspired by Turbo's recent article.

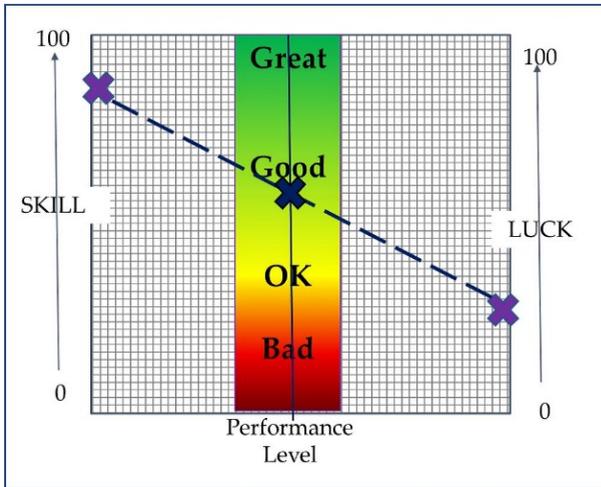
Mike

Editor's note: Download Mike's paper Lessons Learned and Murphy's Corollary on the SETP website here: <https://www.setp.org/services/paper-search.html>.

Lucky or Good – Further Thoughts

Mike Meier

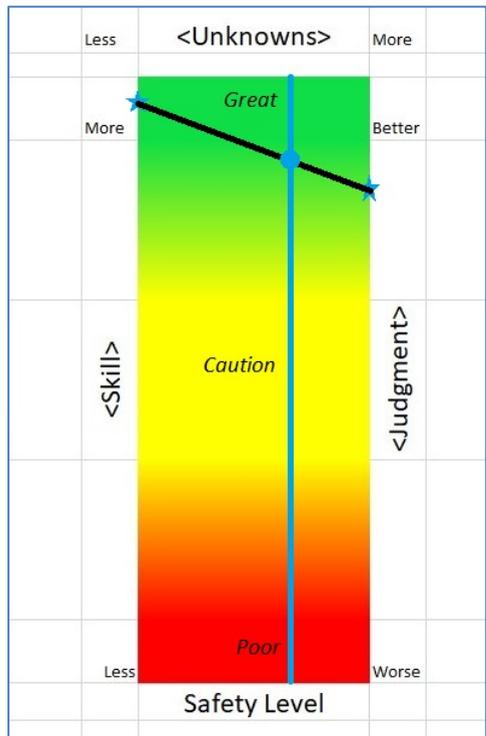
In the May 2021 issue of Flight Test Safety Fact, Art Tomassetti illustrated a favorite theme of his with a colored chart, showing how skill and luck interact to determine performance. One thing I love about the way Turbo presents his ideas, whether in an article or a symposium paper, is how he goes right to the heart of the matter in such a simple and direct way. Turbo's ultimate point here, regarding skill and luck, was this:



“I want both... but I can only make one. So the best thing any of us can do... is to try to increase our skill.” An obvious thought, one might say, and yet somehow, because of the way in which Turbo says it, it really hits home. Another thing I love about Turbo’s presentations is that they make me think. This one made me think a lot, about luck, and about the role luck plays in our performance, our safety and our evaluation of both.

Not being at all shy about stealing from the ideas of others, I began to play around with variations of Turbo’s colored chart, trying to find a way to express how I felt the issue of luck entered into the whole picture. Where I ended up is with the thought that luck is a kind of analogue to “quantum smearing” – the effect by which tiny particles like electrons don’t have a precise location, but more of a smeared probability of where they might be located.

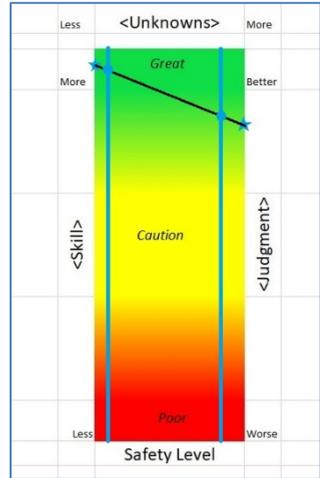
Consider this variation on Turbo’s chart. Here I’ve divided Skill into two components – technical Skill on the left axis, and Judgment (quality of evaluation and decision making) on the right axis. I’ve renamed Performance Level as Safety Level, only because that’s the specific aspect of performance that I’m personally drawn to. I’ve added a third variable (on top), depicted as a left to right variation: the



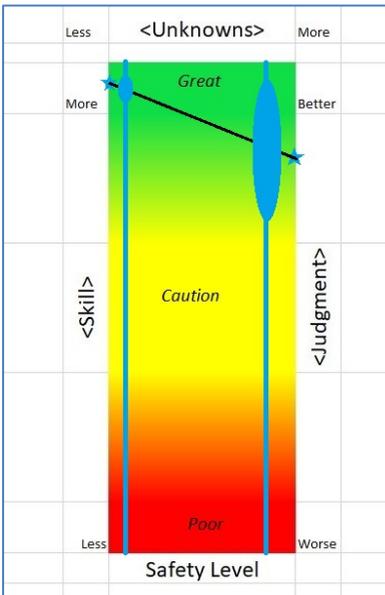
degree of uncertainty or number/significance of unknowns involved.

We can place a point for the level of our technical skill on the left side, and one for the quality of our judgment on the right side, and then draw a vertical line – the left/right location of which depicts the level of unknowns or uncertainty we have about the task or project. Then we find our expected safety level at the intersection of those two lines.

We've started with very good technical skill, and good judgment in this example, so our result is also good. What we can also see in the next chart is that the degree of uncertainty, number of unknowns, determines the degree to which technical skill or judgement will predominate in determining our safety level. If unknowns are few, and our vertical line is situated to the left, then technical skill is the overriding determinant, but as unknowns increase, and the vertical line moves to the right, the quality of our judgment becomes more and more the determining factor. But how does luck fit into the picture?



This is where the smearing effect comes in. The effect of luck is that we can no longer depend on the intersection of the two lines on the chart to precisely



locate our resulting safety level. Luck “smears” the location of this intersection, but it does so differently depending on the level of uncertainty / quantity of unknowns. If the unknowns are few, then not only does technical skill predominate, but the opportunity for luck to play a part is reduced, and the smearing is minimal. If the unknowns are many, then not only does judgment predominate, but the opportunity for luck to alter the outcome is greatly increased. Note that here, in the case where unknowns were high, the smearing effect has both dragged our possible safety level outcome into the caution region, and elevated it to a level above what is commensurate with our level of judgment.

And, of course, these effects feed back into our post event analysis as well. Where luck has a greater opportunity to affect our results, we are

more subject to making errors in our analysis of just what was the quality of skill or judgment we brought to bear on the task.

All of this would suggest that there are three things we can do up front that will improve our safety level. 1) We can increase our skill level. 2) We can increase the quality of our decision making, and 3) we can reduce the number and significance of unknowns.

This third one has the additional benefit that by reducing the opportunity for luck to play a part in the outcome, it also improves the accuracy of our post event analysis of what had been the quality of our decision making.

Turbo Talk

Art "Turbo" Tomassetti

I think I am one of those in the minority when it comes to public speaking. It is not something I am fearful of but rather something I am passionate about. Whether it is live on stage (or virtual over a computer), performing in a video, speaking on a podcast, or even writing for a publication, I love it and am passionate about it. What fuels that passion? Simple, a desire to ***encourage people to think and inspire them to act***. This month we have seen that desire realized in response to our August Podcast and in response to our last Flight Test Safety Fact. In this issue you can view some of our readers/listeners thoughts, reflections, utilizations and even improvement on ideas we have communicated. Thank you to everyone who shared your thoughts, experience, and ideas with us.

One of the objectives of the Flight Test Safety Committee, and any safety organization for that matter, is to communicate information that can improve safety. Simple right? Publish a newsletter, upload a podcast - mission complete. Or is it? How do we assess if we were able to?

encourage people to think and inspire them to act

One of the components of a Safety Management System (SMS) is Safety Promotion, which includes communication. But sometimes I think our interpretation of communication focuses on transmitting the information: Posters, Pamphlets, Safety Days, etc. Great volumes of great information transmitted to the organization. But did we?

encourage people to think and inspire them to act

If we are trying to shape, shift, and improve culture, then I think you have to know not only that the information was received but that it had an effect. This is harder, much harder to do than just the transmit piece. But we can do *hard*, it just takes a little more time, a little more thought, a little more energy, and maybe even a little more help. In my military career one of the tools I had as a leader was something called a Climate survey, It had nothing to do with daily temperatures, but tried to assess the thoughts and

feelings of the organization. Each survey gave you a snapshot of how the organization thought/felt at that time and if you had more than one you could assess trends. A good tool but not without some drawbacks. As with any survey, coming up with the right questions was difficult. Knowing that people provided true responses, how they really felt, had a level of uncertainty, especially when actions didn't match with responses. Assessing whether the things you are doing, information you are communicating, are having an impact is hard. But then again sometimes it isn't, sometimes you get reader and listener feedback that shows that you were able to:

encourage people to think and inspire them to act

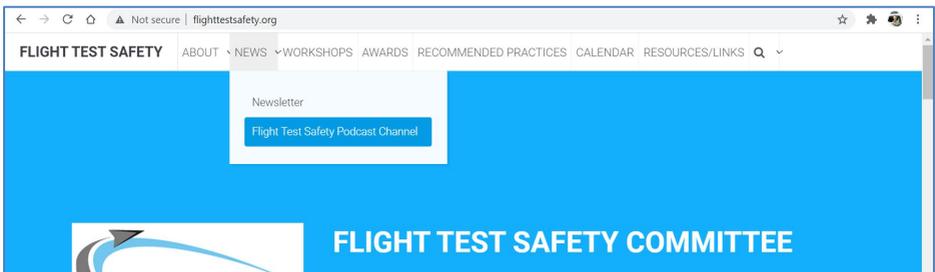
Until next time Be Safe, Be Smart, and Be Ready!

Turbo

Chairman Flight Test Safety Committee

Art Tomassetti

Recommend our Podcast



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