SAFETY FIRST!

A column dedicated to GA safety education

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Your Thinking is Flawed

About the article title: An expert should never say such a thing when testifying in court. But, I did. To an opposing attorney that was cross-examining me. Fortunately, that attorney had a sense of humor and so did the judge. Some judges are not so tolerant.

Have you been reading any NTSB accident reports lately? You might want to apply my title to some of their opinions. I always read them when I consult on an aircraft crash. The NTSB publishes at least two documents, a "Factual Report Aviation" and a "Probable Cause." You can find any accident report by inputting one of several key words or dates at NTSB.gov. Look at the second menu (below the picture on their web site), and click on "Aviation Accident Database."

The "Probable Cause" is obviously an opinion as to what caused the accident, and what may have contributed, even if not the primary cause. It is my understanding that the "Probable Cause" report cannot be used in litigation. Lawyers and experts are not even supposed to mention its existence in depositions or trials because it is inadmissible.

The "Factual Report" is admissible in court, can be relied upon, and is supposed to be just the facts. However, more and more I'm seeing a significant element of opinion entering into these supposedly "factual" reports, even if only by implication. What is more disturbing is, that on many of these cases, the person writing the NTSB final report did not visit the scene or fly the accident scenario. On those reports, the narrative begins:

*** Note: NTSB investigators either traveled in support of this investigation or conducted a significant amount of investigative work without any travel, and used data obtained from various sources to prepare this aircraft accident report. ***

In other words, the investigators obtained their information second hand (or third hand) from someone else and the "someone else" may not have flown in an airplane to see how the scenario appeared to the pilot who crashed.

I recently worked on a clear night crash. On this one I find it unlikely that the NTSB would have prepared its "Factual" or its "Probable Cause" if they had flown the flight path leading up to the accident at night. If you would like to look it up on the NTSB website, this ID will access both reports: ERA10FA048

Two instrument-rated pilots, one of whom was a flight instructor, planned to fly some pattern work on a clear night. They were the first persons to fly the Cessna 172S after it came out of the maintenance shop. Their takeoff and their climb to traffic pattern altitude appeared to the air traffic controller to be uneventful. However, several seconds into their downwind leg in the pattern, the controller saw the airplane suddenly begin an abrupt descent. He made a radio call to them by stating their "N-number" and they responded with their "N-number." Then, with no further communications from the pilots, the airplane descended at an average rate of 3600 feet per minute all the way to the crash site with only a moderate turn towards the airport. Both were fatally injured. The controller was tracking them visually and confirmed that there was no indication of a pull-up that could have led to a stall. He did not observe them climbing nor did he observe them banking much, going into a spin, or into a spiral. The radar data confirmed that they were never flying slow enough to be near stall speed after reaching 1000 feet on the downwind track.

What the NTSB put into their "Factual" report defies logic. Under "Additional Information" on page 1b, the NTSB writer began a discussion about "Spatial Disorientation" and how it can take 35 seconds for an instrument pilot to establish full control. However, that only applies when there are no outside visual references during those 35 seconds, and it is not true for every instrument rated pilot.

The NTSB writer continues with a quote from a book on night flying, which discusses "vestibular disorientation" and how dangerous that can be in an uncoordinated turn. However, the airplane was not turning when the descent began. The NTSB writer then quotes another book, about ending up with overbanking resulting in a descent. However, the controller was watching, and he saw very little banking. Then the NTSB writer quotes the AIM on the "somatogravic illusion" that can result from a rapid acceleration during takeoff, (even though they were now flying level downwind). Must have been one hot 172 to accelerate so rapidly on downwind!

The two pilots had been flying at a constant speed, in a straight line, at a constant altitude prior to the descent. The NTSB writer then speculates that the pilot(s) were looking towards the airport during a turn. However, they weren't turning while flying downwind. The NTSB writer then goes into

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a long paragraph from another advisory circular about the "Graveyard Spiral." Why in the world does he even mention a graveyard spiral, when the controller watching everything saw no spiral of any kind? The controller and the radar confirmed that the airplane was stable at 1000 feet and then made only a gentle turn towards the airport as it descended and crashed.

The NTSB's final statement on this crash:

The National Transportation Safety Board determines the probable cause(s) of this accident to be: The pilots' spatial disorientation during flight in dark conditions, which resulted in an uncontrolled descent into terrain.

The problem with that opinion is that the airplane was flying downwind at a very, very well lighted airport. Besides the brightly lit terminal area, there is a water treatment plant next to the airport that is lit up like a baseball diamond. I flew the scenario at night, and I am convinced that there is no way that two instrument-rated pilots, (one a flight instructor), could become disoriented with that much terrestrial lighting in their left forward view. The NTSB described a dark forest as being a contributing factor. However, on my flights, I observed that the forest would have been on the pilots' right during the several seconds that they flew level on downwind before the descent. Is it reasonable to believe that both pilots would be locking their gaze towards a dark forest on their right, to the exclusion of the brightly lit airport on their left, the airport at which they were soon to be landing?

There is no doubt that spatial disorientation is a factor that should always concern us. However, it does not happen when there are sufficient sources of terrestrial lighting that the pilot can reference easily. It is true that the vestibular apparatus does not know the difference between g-force due to gravity, and g-forces that arise from inertial forces. Those forces act on the vestibular apparatus all the time, flying, driving, walking, or sitting. Most of the time visual perception overrides the illusions that otherwise might make it difficult to perceive which way is up.

I worked on a different case in which the opposing experts opined that spatial disorientation was the cause of the crash on a clear night, in spite of the fact that the pilot was flying alongside an island chain that was well lighted with abundant terrestrial lighting as well as vehicle lighting on a major roadway. One of the experts must have done quite a Google search because the expert had inserted 35 pages of references to every kind of illusion and human factor that remotely might have led to the accident. The expert inserted narratives (duplicating them two or three times) on many classic illusions, such as the leans, coriolis illusion, graveyard spin, graveyard spiral, somatogravic illusion, inversion illusion, false horizon, autokinesis, somatogyral, change in gravity, change in linear acceleration, the head-up illusion, the head-down illusion, the proprioceptive receptors illusions and the featureless terrain illusion. However, she never said which one (or more) led to the accident. I believe her opinion was that, since they crashed and we don't know why, it must have been one of those illusions. Therefore, take your pick.

In that accident, the NTSB's opinion was that the pilot was distracted while looking at her transponder, to the extent that she lost control of the airplane. The NTSB must have some kind of time machine that enables them to go back in time to observe pilots' eyes just before their accident. No one knows what the pilot was looking at! No one knows if the pilot was incapable of maintaining control, (she did have an instrument rating) or whether, instead, there was equipment failure that was impossible to overcome by a pilot. No one saw the airplane crash. The airplane took off one clear night without a flight plan and the first time anyone knew for sure that it had crashed, was when a boater saw a wing floating in the ocean the next morning.

My work on aircraft crashes is challenging but so very interesting. Generally the occupants are no longer alive to tell what was happening just before the accident. As investigators, we must try to understand from the fragments of wreckage and fragments of facts that are obtainable.

During litigation, we often see a great deal of speculation by experts about what happened. In reality, no one really knows. Some experts are masters at weaving a story as to causation, and I sometimes wish I had such an impressive imagination. It is troubling, however, when the NTSB provides speculative opinions about what the pilot was looking at, thinking, and doing prior to the crash. The NTSB job is to report the facts. To me, it appears that the NTSB believes they must always provide a probable cause, including circumstances in which they have no facts to support a basis for their opinion. If they really don't know, why can't they just say so?

For us as flying physician pilots, the important thing about spatial disorientation is to stay current with our instrument skills so that our name does not end up in an NTSB report. Let's keep the oily side down!

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