Curbing a KILLER

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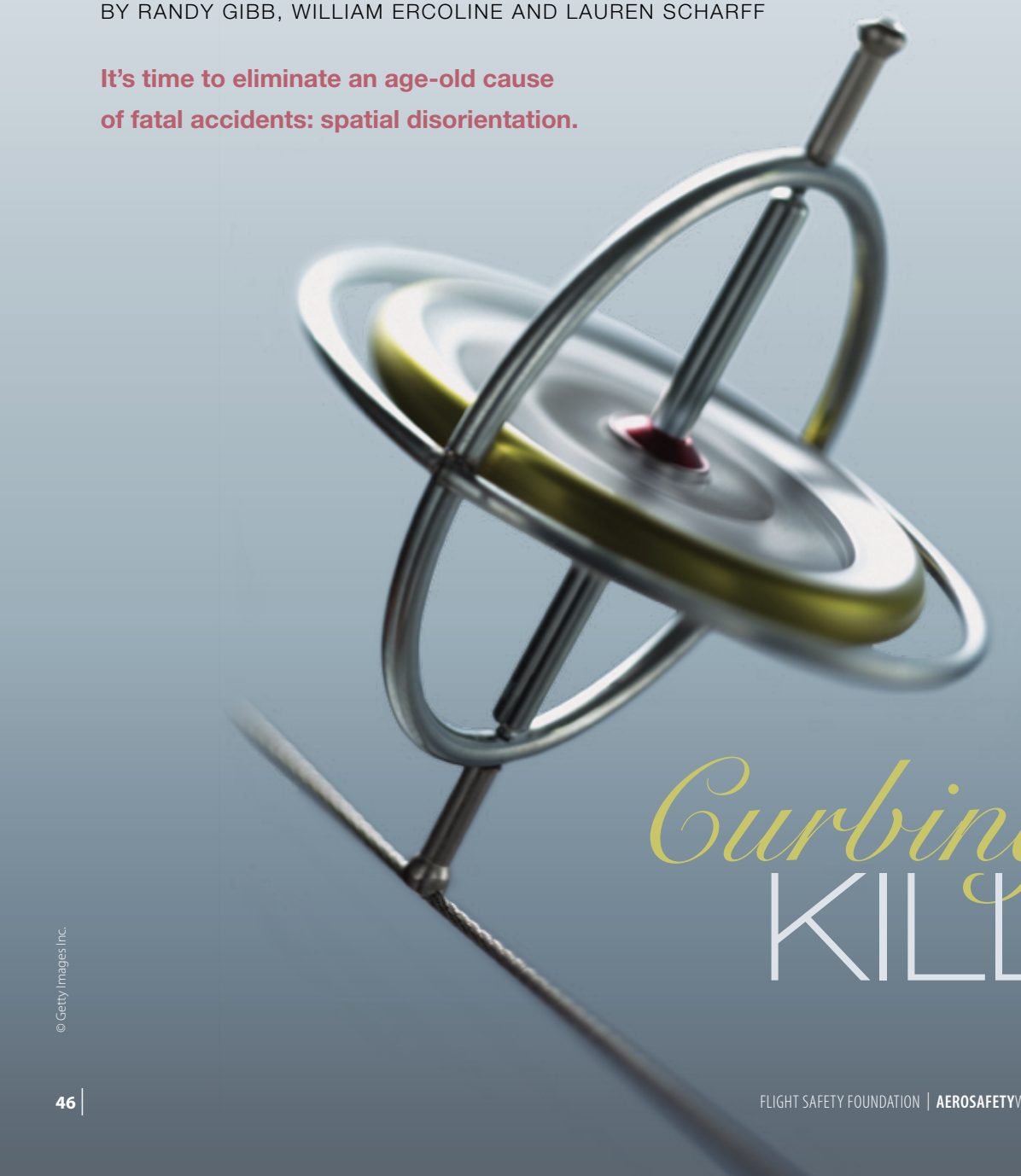
It's time to eliminate an age-old cause of fatal accidents: spatial disorientation.



The aviation community needs to re-energize its efforts to increase awareness, training and research regarding the potentially fatal consequences of spatial disorientation. There are still far too many examples of pilots falling prey to this age-old killer. At a time when technology adds more to the pilot's toolbox of information and capabilities, impediments to information processing and attention are not being addressed sufficiently.

Spatial disorientation occurs when a pilot fails to properly sense the aircraft's motion, position or attitude relative to the horizon and the earth's surface. Spatial disorientation can happen to any pilot at any time, regardless of his or her flying experience, and often is associated with fatigue, distraction, highly demanding cognitive tasks and/or degraded visual conditions.

In 2008 and 2009, the U.S. Air Force lost two F-16s, an F-15E and three of the four pilots. These accidents involved pilots flying highly demanding night missions while wearing night vision goggles. All four pilots had the best training, equipment and technology available, yet they may have succumbed

to sensory illusions that disabled them from properly orienting themselves within their environment.

In the last few years, there has been an alarming increase in the number of commercial aircraft accidents occurring at night while on climb-out over water. In January 2004, a Flash Airlines aircraft descended into the Red Sea minutes after takeoff on a moonless night from Sharm el Sheikh International Airport in Egypt; 148 people were killed. In May 2007, a Kenya Airways aircraft crashed into a swamp after spatial disorientation and loss of control occurred during climb-out on a dark night on departure from Douala Airport in Cameroon; all 114 people aboard perished. In January 2010, all 90 people aboard were killed when an Ethiopian Airlines aircraft crashed into the Mediterranean Sea shortly after takeoff on a dark and stormy night from Beirut International Airport in Lebanon.

Disagreement and Denial

These accidents demonstrate the tragic consequences of spatial disorientation. They are not isolated cases. There are many more documented accounts of in-flight sensory confusion that led to loss of life. However, it is almost as if the aviation community has accepted spatial disorientation as a cost of doing business.

Many people may not be aware of the seriousness of spatial disorientation because of inaccurate and under-reporting. Two factors contribute to this problem: a lack of consensus on what should be termed spatial disorientation and how to categorize mishaps; and the difficulty of "getting in someone's head" to understand what happened, particularly when the pilot did not survive the accident. These factors have produced disagreement about the "causes" of many accidents, including those cited above.

Most pilots underestimate the likelihood of spatial disorientation and believe it won't happen to them. Additionally, some have experienced and survived spatial disorientation and believe that they can do so again.

However, consider how often accidents are reported using descriptions that include "poor weather" (e.g., visual flight into suddenly degraded visual conditions), "controlled flight into terrain," "loss of control" or "loss of situational awareness." It is common for news stories to report the cause of an airplane accident simply as "pilot error." Is it really pilot error if the aircraft's orientation could not be accurately processed by the visual and vestibular sensory capabilities of the pilot? Possibly, a better description would be: "The pilot's sensory and perceptual capabilities were exceeded."

Cognitive Overload

Many people both within and outside the aviation community believe that advances in technology have reduced, and will further reduce, the likelihood of aviation mishaps, including those caused by spatial disorientation. Yet, spatial disorientation still accounts for nearly 25 to 33 percent of all accidents. Given the inaccurate and under-reporting of spatial disorientation, that estimate most likely is low.

While technology certainly has helped make some aspects of aviation safer, the addition of new instrument displays has increased the cognitive load experienced by pilots. More sources, layers and types of information are being added with little consideration of the very real limits of human information processing. Recall that one of the risk factors for spatial disorientation is cognitive task saturation.

Fortunately, there are ways to reduce the likelihood of spatial disorientation. For example, research on improved training has demonstrated that specialized simulators with engineered scenarios can greatly improve pilots' recognition of situations that may lead to spatial disorientation and teach risk-mitigation procedures. However, more research is needed to further investigate pilot interactions with new technologies and to help develop displays that reduce, rather than increase, cognitive load.

Several countries in Asia and Europe have already committed to efforts to reduce spatial disorientation mishaps in aviation. In the United States, an effort led by the Air Force and the Navy is reinvigorating resources to achieve the same goal. However, for meaningful progress to be made, long-term commitment and funding are needed.

Let's not wait for yet another tragic aircraft accident to remind us of what we already know: Spatial disorientation is a killer. We must commit to its prevention. Awareness is the first and most important step in making the sky safer for us all.

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