

There has been a great deal of discussion lately about organizational responsibility versus individual responsibility for aviation mishaps. Although the main body of research for the last 30 years has shown that aviation accidents mainly are organizational accidents, the role of the individual — the pilot, maintenance technician, dispatcher, etc. — cannot be discounted. The answer to the organization/individual dilemma might lie in the role of perception in hazard identification.

A previous article (ASW, 3/11, p. 30)¹ discussed the unspoken language of threat and error management (TEM), which comprises three words: *Huh?*, *Whoa!* and *Phew!* The central theme was that each of us builds up a valuable library of lessons based on our training and experience. Some lessons are easily recalled as they are stored in our conscious minds. Other lessons have been partially forgotten and exist primarily in our subconscious minds.

In this context, *Huh?* (*I wonder what that is?*) is the most important word in TEM's unspoken language because it represents the recognition that something is not right. The question comes unbidden from the lessons stored in our subconscious. When the question arises while performing an operational aviation task, it may signal an important recognition of a hazard and should not be ignored.

The other two words of TEM's unspoken language — *Whoa!* and *Phew!* — are



THE NEED TO BY THOMAS ANTHONY WITH CHRIS NUTTER

Notice

Hazards can evade identification when not clearly perceived.

the result of *not* recognizing the significance of *Huh?* in identifying a hazard.

Two related processes of perception — *noticing* and *not noticing* — have a direct bearing upon hazard identification. As with TEM's unspoken language, they are deceptively simple but may provide valuable insight into hazard identification.

Noticing (The Mini)

An example of *noticing* is the experience that a proud couple (Tom Anthony and his wife) had while trying to decide what kind of car to buy for their daughter, who was returning home

involuntary act of cognition much like the involuntary recognition in *Huh?*

In his book *Blink: The Power of Thinking Without Thinking*, Malcolm Gladwell cites an even more dramatic example of the subconscious processes of *noticing*.² An ancient marble sculpture of a Greek youth purchased for \$10 million by a museum came with substantial documentation of authenticity. The director of the museum proudly showed the new treasure to Thomas Hoving, former director of the Metropolitan Museum of Art in New York. After looking over the sculpture, Hoving asked, "Have you paid for this?" He added this



after two years of service with the Peace Corps in Honduras. Their discussions led to the Mini Cooper as possibly the best choice.

They were surprised when Minis began to appear everywhere — in the hardware store parking lot, alongside at a traffic light ... here and there ... *everywhere*. Was there a sudden explosion in the number of Minis in their neighborhood? No. They simply experienced the phenomenon of *noticing*.

They were not consciously looking for Minis, but they were *noticing* them. It was an

advice: "If you haven't, don't. If you have, try to get your money back."

There wasn't a single element of the sculpture that appeared false to Hoving; but, as a whole, the sculpture did not ring true. It ultimately proved to be a forgery produced in the 1980s.

What can this example from the world of art teach us about aviation safety? It is further evidence that, through our experience and training, we build up a library of lessons, some of which we "just can't put our finger on" but are nonetheless real, valuable and not to be ignored.

Not Noticing (The Gorilla)

In their book, *The Invisible Gorilla: And Other Ways Our Intuitions Deceive Us*, Christopher Chabris and Daniel Simons recount an experiment that they conducted in the Harvard University psychology department in the 1980s.³ A video of the experiment on YouTube shows two commingled teams passing basketballs among themselves. One team is dressed in black uniforms and the other team is dressed in white uniforms.

The viewer is directed to count the number of times the white team members pass the ball to each other. (The correct number is 34.) However, during the one-minute video, a person dressed in a gorilla suit walks into the middle of the game, thumps its chest, walks about and leaves. The gorilla is on camera about nine seconds.

After watching the video, the viewer is asked if he or she noticed a gorilla. Invariably, about half of first-time viewers say that they did not see the gorilla. They did not *notice* the gorilla because they were looking for something else. They were focused on counting the number of times the white-team members passed the ball to each other.

Fatal Not Noticing (Motorcycles)

Analogous findings of a more critical and safety-related nature have been generated from

research on motorcycle accidents. For example, Harry Hurt, a professor at the University of Southern California (USC), in landmark research conducted for the U.S. Department of Transportation and published in 1981, found that “the failure of motorists to detect and recognize motorcycles in traffic is the predominant cause of motorcycle accidents.”

Hurt explained that “the driver of the other vehicle involved in the collision with the motorcycle did not see the motorcycle before the collision, or did not see the motorcycle until too late to avoid the collision.”

Similar findings resulted from the Motorcycle Accident In-Depth Study, conducted in five European countries in 1999 and 2000. The researchers concluded that the lack of evidence of emergency braking or avoidance maneuvers by the drivers of vehicles that struck motorcycles confirmed that the drivers did not see the motorcycles.

How Much Is Unseen?

The “invisible gorilla” experiment and the motorcycle safety study underscore a fundamental fact: Although light reflected by the gorilla or the motorcycle passes through the lens of the eye and strikes the retina inside the eye, there is no cognition — the objects are *not seen*.

This raises a compound question: How much are we not seeing, and is any of it important? Certainly, the images of the motorcycles were critically important.

As aviation professionals, we want to *notice* hazards and avoid *not noticing* them. Gregg Bendrick of the U.S. National Aeronautics and Space Administration and the USC Aviation Safety Program describes the

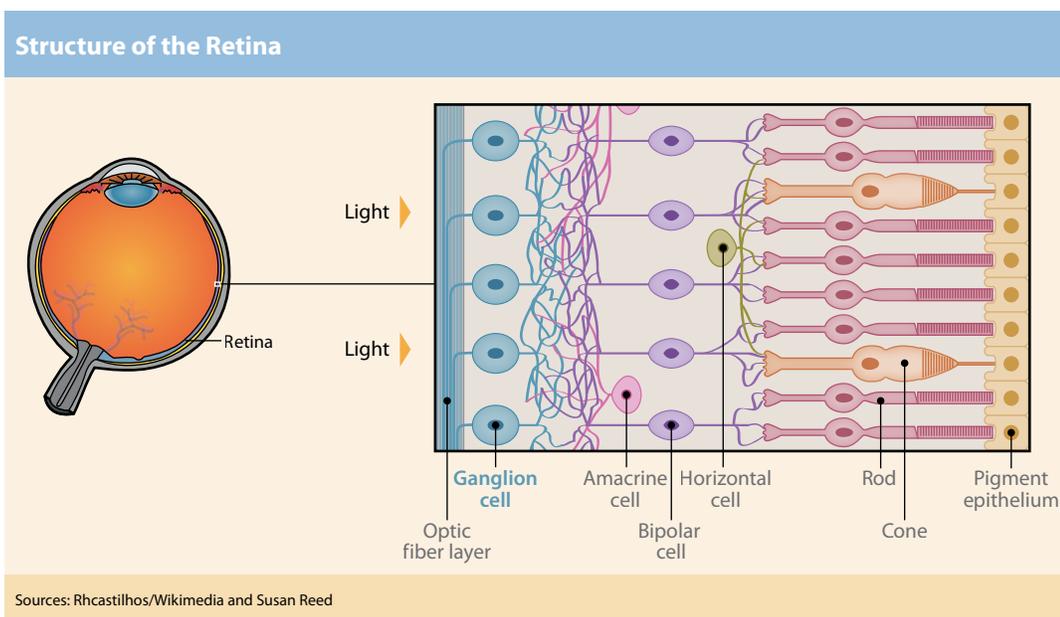


Figure 1

hazard-identification functions of the retina as follows: “The retina of the eye has very specific structures within it which function as optical hazard-identification and risk-assessment mechanisms. These are the cones and the rods of the retina. The cones (so named because of their conical shape) are concentrated in the center of the retina. The rods (so also named because of their shape) are dispersed over the wider area of the retina with a much lower level of concentration.

“The cones process visual information for our central vision. The central vision is what we see and are consciously aware of. It is what we are ‘looking at.’ On the other hand, the rods process information of the peripheral vision. In effect, the rods, which feed our peripheral vision, act as light and motion detectors, as well as a basic horizon indicator.

“We can ‘see’ things via this peripheral vision but not be consciously aware of them. The peripheral vision helps with our overall spatial orientation, and when a light or relevant motion ‘catches our eye,’ our brain redirects the eyes to focus the central (cone) vision onto the item of interest. That is, the item is now brought to our conscious level of awareness.

“This duality of vision also allows us to focus on something, like reading a newspaper or viewing an iPod while we are walking. We can do these two things at once, and we may not be conscious of the walking function, nor the general surface of the walkway ahead, though it is being subconsciously processed.”

The rods, then, provide a very important *Huh?*-like function. They sense movement and environmental differences, and they act automatically to direct the central vision to focus on the item identified to be of further interest. In a sense, it is a physiological TEM function.

More Than a ‘Camera’

In a recent discussion of the retina as a hazard-identification mechanism, Bendrick provided two additional insights that have powerful safety implications and bear upon the question of organizational/individual responsibility.

First, although the retina is located within the eye, it is actually part of the brain. Second, while for years scientists have identified rods and cones as the only significant light-sensing mechanisms within the eye, recent research has identified a third type of light-sensing neurons in the retina: the *intrinsically photosensitive retinal ganglion cells*, which transmit signals to control our circadian rhythms and other photoperiodic functions (Figure 1).

Circadian rhythms have a direct bearing upon our levels of mental awareness and our abilities to *notice* and identify hazards, and our tendency to *not notice*.

So, unlike our earlier conception of the eye (retina) as simply a remote camera that transmits raw data to the brain, where it is processed and analyzed, research has found evidence that the retina also performs the traditional brain functions of processing and storage.

Sigmund Says

Sigmund Freud, in *The Psychopathology of Everyday Life*, points out that “no person forgets to carry out actions that seem important to himself.”⁴ Using himself as an example, he claimed an excellent memory but admitted that he sometimes forgot appointments with patients that he was treating at no charge.

Freud underscored this observation with the comment: “What one forgets once, he will forget again.”

He also provided a personal insight into peripheral *noticing*: “Both irritating and laughable is a lapse in reading to which I am frequently subject when I walk through the streets of a strange city during my vacation. I then read ‘antiquities’ on every shop sign that shows the slightest resemblance to the word; this displaying the questing spirit of the collector.”

Noticing is the opposite of *forgetting*. It is *uncommanded remembering*. As Freud pointed out, we notice what we are interested in or value; we forget (or do not notice) those things that we see as unimportant or do not value. Our interests reflect our values — those things that we see as

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important, those things that we see as unimportant.

What role does the organization have in creating the values, and therefore the interests, of its employees?

George S. Patton might have provided the answer when he took command of the U.S. Third Army and addressed its 90th Division as it prepared to go back to the front during World War II. The troops had experienced some rough going prior to Patton assuming command, and their performance had been not wholly successful. Nevertheless, the general let them know that they were the best damned troops in this man's army.

Later, he was asked by an aide if he really thought they were the best. Patton replied that *it was not important that they were the best, it was important that they thought they were.*

Values Affect Perception

These examples demonstrate the role of values in influencing individual perception and performance. Where have we seen the word *values* before? It is in our definition of *organizational culture*: the values, beliefs, roles and behaviors that define the identity of a particular organization and the individuals that function within it.

An organizational culture reflects the values, beliefs and roles expected from employees. It must be established and maintained in a tangible, organized and coherent way in which actions support words. There can be no difference between what leadership says and what it does. The leadership of an organization has the power to create a synergistic organizational culture or a "malergistic" organizational culture rife with negative interaction.

Moreover, an organization cannot expect a high level of personal responsibility from its employees if it does not

treat them with respect.

The English poet and artist William Blake said, "A fool sees not the same tree that a wise man sees." Organizations are better served by wise men than by fools, but wisdom is the result of learning, rather than birth. Organizations can create their own "wise men" by valuing learning, sharing and communication. Wisdom is the fruit of understanding, not of rote repetition or blind obedience.

The responsibilities of the individual are significant as well. The primary responsibility of individuals is to perform their jobs to the full extent of their abilities and training, with honesty and without reservation. Individuals must act and communicate in the interest of the organization that employs them.

Inherent in the responsibility to communicate is the recognition that each individual has a valuable role in hazard identification. Without the full participation of employees at all levels in hazard identification, an organization cannot operate safely and productively.

The willingness of the individual to communicate and report honestly reflects directly upon the culture of the organization. The organization must have practices and procedures that value communication and reporting. It must have a *reporting culture* as part of a *learning culture* that enables long-term organizational growth and viability.

Asking Why

Anyone seeking a simple answer to the question of organizational versus individual responsibility is bound to be disappointed. Aviation is a complex, technical and highly evolved environment in which each part has a potential effect or co-dependency upon other parts. It is unrealistic to expect a simple answer when dealing with such a complex and highly evolved system.

What is simple, though, and can be universally expected to produce a true and accurate answer with regard to the world of aviation mishaps is the universal question: *Why?* This question is a tool that, with dedication and application, can produce the most honest and complete explanation of any mishap, whether in the aviation environment or in any other complex technological environment.

Why? is the tool that leads us from impression to answer, from incomplete to complete. It is a tool for correcting underlying causes rather than for satisfying the superficial demands of the moment.

The Mini Cooper, the invisible gorilla, motorcycles, Sigmund Freud, George Patton and the physiology of the eye are diverse sources upon which to draw insights into aviation safety. However, we believe that the insights are valid and valuable. They underscore the complexities of individual perception and the role of organizational culture in creating the values and beliefs that direct and shape our perception of the outside world. 🍌

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Notes

1. The article is available at <flightsafety.org>.
2. Gladwell, Malcolm. *Blink: The Power of Thinking Without Thinking*. New York: Little, Brown and Company, 2005.
3. Chabris, Christopher; Simons, Daniel. *The Invisible Gorilla: And Other Ways Our Intuitions Deceive Us*. New York: Random House, 2010.
4. Freud, Sigmund. *The Psychopathology of Everyday Life*. From *The Basic Writings of Sigmund Freud*, translated and edited by Brill, A.A. New York: Random House, 1938.