

huh | hə | ■ interj. used to express surprise, disbelief, or confusion, or as an inquiry inviting affirmative reply

whoa | wō | ■ interj. 1 used as a command to a horse to make it stop or slow down 2 informal used as a greeting, to express surprise or interest, or to command attention : *whoa, that's huge!*

phew | fyō | ■ interj. relief or fatigue 2 use disgust at or as if at an

TEM's UNSPOKEN Language

BY THOMAS R. ANTHONY

Acting on subtle trouble clues is an essential element in the process of defeating developing risks.

There is an unspoken language, although sometimes it ripens into discussion, associated with the threat and error management (TEM) process. It is a simple language of just three “words.” Commonly known and widely used, these words have a connection to the world of TEM that has gone unnoticed. The three words are: *Huh?*, *Whoa!* and *Phew!*

From the aviation safety perspective, the word *Huh?* is the most important; the others flow from it. There are two common usages of the word *Huh?*. The first is “*Huh?* I didn’t know that.” The second is “*Huh?* I wonder what that is.”

For the purposes of TEM, we are only interested in the second. So why are we interested? Because this word is an identifier of a potential threat or hazard. We utter *Huh?* when something doesn’t make sense, when we hear a sound or experience a sensation that we cannot explain, or observe something that we didn’t expect.

Huh? is an involuntary word. Something has happened, and we can’t figure out what it is. The occurrence may not be dramatic enough to demand our immediate attention, but in the world of aviation safety, the word *Huh?* should not be ignored. Like a piece of yarn tied

to the shroud of a sailboat, it is a telltale, an indicator that something changed, perhaps for the worse.

Huh? is an indicator that a threat or a hazard may be present. While not a red flag, it is often a yellow flag that requires our attention, or a warning to proceed with caution. As aviation professionals, everything should make sense to us. When something doesn’t, the reason needs to be found.

When things don’t make sense, the minimum action is to vocalize and identify the situation in a question: “That frequency change doesn’t make sense” or, “Why would they assign that

runway?” Recognition and vocalization drags the *Huh?* moment out of the realm of a “vague sense of unease” and places it squarely on the table for resolution or confirmation by ourselves and others.

At the very least, vocalizing the *Huh?* starts the process of cautionary mitigation — “I guess we should look at this a little closer,” or “I guess we should confirm that frequency.” In a way, *Huh?* serves as a probabilistic risk assessment, another good reason that verbalizing such a condition to others can help mitigate and manage the associated threat or hazard. Upon the announcement of the word *Huh?* there exists at least some cognitive processing of whether this new thing represents a high level of risk, launching a proactive risk assessment that seeks to complete the risk matrix in real time, followed by mitigation development.

Why is this important? Often, when performing a demanding operation or task, our attention is focused on a single thing, or a set or sequence of things. The temptation is to continue with the attention-demanding task until it's completed. But in doing so, we may ignore the relatively undemanding— at least immediately — circumstance that has generated the *Huh?* feeling. This myopic task fixation would, of course, be the wrong response. Similarly, another wrong response is: “Oh, it's probably nothing,” without investigation. Ignoring the *Huh?* can be as detrimental as excessive attention to a singular task.

So where do these *Huh?* sensations come from, and why are they important? Sigmund Freud, often called the father of psychoanalysis, explains the mind in terms of three levels of awareness: the conscious, the subconscious and the preconscious. He distinguishes the preconscious from the subconscious as follows:

[There exist] two kinds of unconscious — one which is easily, under frequently occurring circumstances, transformed into something conscious, and another with which this transformation is difficult and takes place only subject to a considerable expenditure of effort or possibly never

at all. ... We call the unconscious which is only latent and thus easily becomes conscious, the 'preconscious' and retain the term 'unconscious' for the other.¹

When we perform a demanding task that requires our complete attention, we are operating at the conscious level. We are not aware of everything that is stored in our memory, since everything that can be recalled is the preconscious. I believe that the *Huh?* phenomenon is the recognition that something doesn't make sense on the preconscious level.

The preconscious comprises all of the experiences and lessons we have logged. For aviation professionals, this represents a significant mental database. So, while we are not aware in the present moment of all that we have learned, that information is stored in our preconscious, just out of sight, so to speak. It is similar to the phenomenon of a difficult-to-remember name popping into our mind, that event indicating there was processing going on at the preconscious level. It is this preconscious processing that is responsible, I believe, for the *Huh?* phenomenon. We ignore the *Huh?*s at our peril.

People have recognized this phenomenon over the ages. Family members are advised to “sleep on it” before making any big decisions. Why is this good advice? It allows us to use the lessons, information and values that are in the preconscious, which are not immediately available to us while we are talking with the salesman at the used-car lot.

The Second Word

The second word in the unspoken language of TEM is “*Whoa!*” While punctuation is dependent upon context, the word *Whoa* is almost always followed by an exclamation point, as in “*Whoa! What the heck was that?*”

Whoa! is a relatively simple word compared to *Huh?* Its importance in the world of aviation safety is that it is the word that may follow when the first unspoken word (*Huh?*) is ignored. While we call it a word, it is better described as a spontaneous utterance, a class of speech given a special status in the eyes of the law of the United

1 used to express
d to express
unpleasant odor

This is a proactive risk management process in real time.

States. As with many legal concepts, there is a Latin term for spontaneous utterance; it is *res gestae*. The spontaneity of such utterances is judged to be of such genuineness that they may be reported by others and taken as evidence in a court of law.

So what does that mean to us? Like *Huh?* the word *Whoa!* is an automatic verbal signal. It is the immediate and automatic recognition that a threat or hazard condition exists or has just existed. It lacks, however, a complete element of cognizance of what the hazard really is, as in the earlier “*Whoa!* What was that?”

The Third Word

The third word of the unspoken language is *Phew!*, the natural follow-on to *Whoa!* It is uttered after the threat or hazard has passed, and it reflects a certain degree of understanding of the threat or likelihood and the severity of the threat or hazard condition, and indeed the acceptable outcome of the risk event. In most cases of *Phew!*, the likelihood was close to 100 percent, and the appreciation of this is clear and inescapable. In this sense, *Phew!* functions as a rapid risk assessment of a historical threat or hazard — a verbal, determinate risk assessment process, including outcome.

While there is often very little that can be done following the utterance of *Whoa!*, *Phew!* (like its cousin *Huh?*) presents very real opportunities for significant safety action. Like *Huh?*, however, we ignore the *Phew!* utterance at our peril. Unless the *Phew!* moment is followed by analysis of what caused it, as well as a mitigation of those causes, a sort of real-time root cause analysis, the original hazards that started the *Huh?*, *Whoa!*, *Phew!* chain remain unchecked. The absolutely wrong response to *Phew!* is: “*Phew!* That was close, but I’ll be fine from now on.” The correct response is: “I’ve got to figure out why that happened and change something.”

Words in Action

Cmdr. Chris Nutter, in his previous career as a U.S. Navy A-7/FA-18 pilot, recounts the

following story: He and a wingman were blazing southbound on a low-level training route in the Panamint Valley desert of California. With things happening very quickly, Chris sensed a *Huh?*, followed immediately by a significant deceleration. Immediately, he heard his wingman announce over the radio, “*Whoa!*”

Nutter responded “What do you mean, *Whoa?*”

The wingman answered quickly: “Yeah, you just lost about 6 ft of your tailpipe,” a confirmation of the condition that prompted *Huh?* As the aircraft lost most of its thrust and was rapidly losing airspeed, Nutter traded the speed for altitude for either a one-time shot at essentially a no-thrust landing or positioning the aircraft to allow a controlled ejection in a safe area. In the end, Nutter landed safely at China Lake, a Navy airport.

Nutter, now Capt. Nutter with Alaska Airlines and a University of Southern California (USC) aviation safety management instructor, adds: “Effective threat management techniques can include a conscious awareness of the secret words, and a crew agreement that when they arise, they are verbalized and addressed by the crew.”

This is a proactive risk management process in real time. But, by the time *Whoa!* happens, the crew is committed to managing either an error or hazard that now demands immediate attention and mitigation, and deliberate action to restore reduced risk levels. In some tragic accidents, while there may have been a *Huh?* there may not have been sufficient time between *Whoa!* and impact to resolve the situation.

These three unspoken words are an effective articulation of the need for real-time risk management, with direct relevance to modern safety management. The word *Huh?* validates what many pilots for many years have said when “something doesn’t feel quite right.” Often, things are not right, indeed, and the operation needs attention — identification, mitigation and resolution. Recognition of the “*Huh?*” and implementing appropriate risk management are real, effective methods of assuring operational safety.

Another Word

A careful reading of Nutter's incident reveals that his *Huh? Whoa!* sequence did not end in *Phew!* It ended in something akin to "Oh, Jeez," "Darn" or a more salty expletive. The reason that these types of words are not included in our TEM lexicon is that they take us outside the realm of threat and error management. They belong instead to the realm of crisis management, emergency response or recovery. If we fail to control the threat or hazard early, to some extent we may become controlled by it.

Other Examples

Dr. Gregg Bendrick, a U.S. National Aeronautics and Space Administration flight surgeon and an instructor in the USC Aviation Safety Program, notes that the human eye possesses mechanisms that function in a way very similar to the *Huh? Whoa! Phew!* model.

The retina of the human eye contains two types of sensory elements: rods and cones. The cones — so named because of their conical shape — are concentrated in the center of the retina. The rods — 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.

On the other hand, the rods process information of the peripheral vision. In effect, the rods — the peripheral vision — act as a light and motion detector, as well as a basic horizon indicator (Figure 1). We can "see" things via this peripheral vision but may 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 awareness.

The rods, and therefore the peripheral portion of vision, also combine with input from the vestibular structures of the brain that help control balance. This duality of vision also allows us to walk while focusing our central vision on

things like reading a newspaper or viewing an iPod. We may not be conscious of the walking function, nor the general surface of the walkway ahead, but it is being subconsciously processed. The rods, however, possess 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 need further attention. In a sense, it is a physiological TEM function.

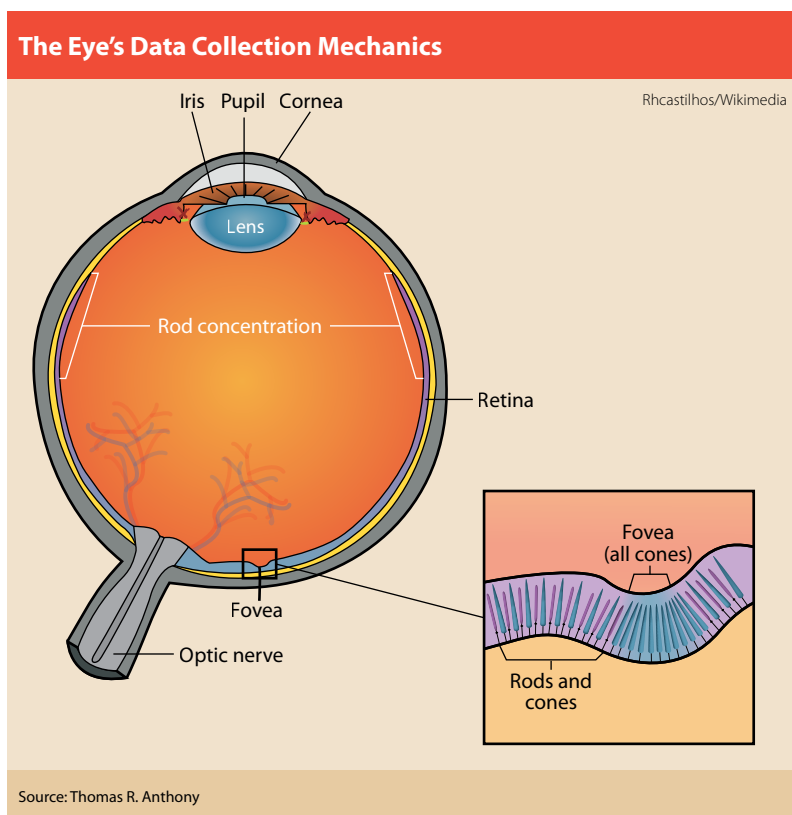


Figure 1

Understanding a little more about rods and cones gives further insight into their distinct but dependent function. The concentrated cones that feed our central vision are able to make acute discriminations among objects, so that's where the eye's best vision can be found, 20/20 or better. Visual image acuity for peripheral vision via the retinal rods is limited to 20/60 at best. Similarly, cones can distinguish the full color spectrum, while rods can detect only a single green-blue color.

This central vision/conscious mind, peripheral vision/unconscious mind duality explains

**'The airplane is
talking to you.
Better listen.'**

the “invisible gorilla” phenomenon that many of us have witnessed when watching the popular video used to demonstrate selective vision. Students are told to count the number of times a basketball is passed among members of a white-uniformed team. The video is played, and the white team passes the ball about 20 times. While the ball-passing activity takes place, a person dressed in a gorilla suit walks among the players. After the video is played, the instructor asks how many people saw the gorilla and is often met with the question “What gorilla?” from a large portion of the class. Insight into the dual functions of the eye lets us understand that the invisible gorilla phenomenon is not just a matter of attention but is also a matter of physiology as well.

This rod-based peripheral detection capability is a physiological component of the unspoken word *Huh?*, and it highlights how important it is to consciously risk-manage our *Huh?* events.

Useful Lessons

The first lesson is to understand that the *Huh?* phenomenon is an indicator that a threat or hazard may exist. The fact that we aren't able immediately to determine what created the *Huh?* effect is not important. Capt. Guy Woolman of Southwest Airlines describes the *Huh?* feeling associated with an unusual sound as: “The airplane is talking to you. Better listen.”

It is important to understand that the *Huh?* phenomenon is a result of the fact that the mind, like the eye, is not conscious of all that it knows at all times. We experience this from time to time when we cannot immediately recall a name. Trying harder seldom gets us closer to remembering. However, when we set the task aside and think about something else, the memory often pops up like a cork on the surface of a pond. Our mind has been working on the problem unconsciously — or subconsciously, I don't know which. The conscious mind is not always the most direct link to remembering. But the important thing is to recognize that this is the way the mind sometimes works.

As Nutter says, the most important step after *Huh?* is to verbalize the concern and then seek additional information.

Questionable Words

Certain phrases are often associated with a less than productive approach to TEM. Among them are:

- “I can handle this.” This is often associated with the recognition of an increased hazard level with no accompanying mitigation other than increased concentration of the type that can cause us to miss the gorilla.
- “Gulp.” This is associated with recognition of an increased hazard environment and no mitigating measures.
- “... No matter what.” This gives permission to all who hear it to depart from standard operating procedures (SOPs), regulations and established safety standards in order to meet a single threat or hazard. It is inherently a hazard-creating statement, and is not easily withdrawn.
- “Hey, watch this,” or “I bet you've never seen this before.” These are phrases that almost certainly precede a hazardous act, an intentional noncompliance with SOPs, regulations and established safety standards, and within another frame of reference are a significant contributor to the automobile insurance rates charged for teenaged males.

So, follow through in examining the *Huh?*s encountered and pay attention to what the *Whoa!*s and *Phew!*s tell us about what just happened; these are processes that are at the heart of TEM. ➔

Capt. Chris Nutter contributed to this story.

Thomas R. Anthony is director of the Aviation Safety and Security Program at the Viterbi School of Engineering, University of Southern California.

Notes

1. Freud, Sigmund. *New Introductory Lectures on Psychoanalysis* (1932).