

Wind the Clock: Using Mindfulness in Aviation Safety.

When I first started flying for the Air Force, I was taught a simple technique to go from a *normal* state of stress to a *critical* state of stress. A common mental ordering of tasks, especially in emergencies is *Aviate, Navigate, and Communicate (ANC)*. When an emergency or any abnormal situation occurs and the pilot is bombarded with a multitude of options and stimuli, he or she can quickly prioritize based on ANC. But even this simple mnemonic isn't the real starting point.

As pilots, we often complain that our job is hours of boredom interrupted by moments of sheer terror. The company gets paid for the hours of boredom, but we really get paid for how we act during those moments of sheer terror. Even the most jaundiced mind realizes this is a big jump from boredom to terror and hopefully back to boredom. So how do pilots accomplish this?

Experience, and training, and accident investigations are the keys to bridging the gap between boredom and terror. Pilots learn to react from memory during the most critical emergencies. In simulators, we practice maximum crosswind landings, engine out procedures at maximum gross weight, or rapid landings when the plane is on fire. Because of this simulator training, the deadly consequences of these emergencies are becoming rare. But, what about other emergencies that should be handled relatively easy, but result in catastrophic endings?

For example, Air France flight 447 entered an area of thunderstorms and icing. The Airbus 330 was piloted by 2 First Officers (FO); the captain was resting, as required by regulations. This article is not a rehash of what happened, but is used to point out that the situation can change in a moment, and the initial actions can make a deadly difference.

Modern airplanes are a collection of computers interconnected and interfaced with the aircrew. Modern planes are so complicated they often have computers decide which malfunctions the pilots should know about and which ones the computer can just take care of. Often, the pilots don't know of a malfunction the plane handled, until they are on the ground at the end of the flight or the situation gets complicated. This is known as *mindful indifference* (Berthod & Müller-Seitz, 2017). The engineers and test pilots have made these critical decisions during design.

In the case of AF447, the FOs were concerned about important tasks of deviating around storms and communicating their deviation to Air Traffic Control (ATC). They were not aware that a few of their airspeed measuring instruments were failing due to icing. The pilots realized something was wrong when the autopilot disconnected and the plane started to descend. The autopilot disconnecting is a sign that there is something going on beyond the computers' ability to handle the problem. The disconnect is accompanied by a loud warning to make sure the pilots are immediately aware that there is no one "aviating," the first rule of piloting (ANC).

The pilots were shocked into awareness and the flying pilot pulled the nose up abruptly to stop the descent. Through no fault of their own, they were not mindful of their current deadly situation. The aircraft began to stall due to low airspeed. Both pilots and eventually the Captain did not correctly identify the malfunction. The result the loss of everyone on board. Could mindfulness have made a difference?

Understanding *mindfulness* and how it might be used in aviation is important. Mindfulness is a term so overused that it is easily mistook as a fad. In fact, mindfulness has been around for over 2500 years and has its roots in Buddhist traditions. Mindfulness is the act of becoming aware of the present without judgement. According to Jon Kabat-Zinn who is the founding executive director of the Center of Mindfulness in Medicine, Health Care, and Society, “mindfulness is the awareness that arises from paying attention on purpose, in the present moment, nonjudgmentally. Once one starts to really pay attention it becomes obvious how many ideas and opinions, likes and dislikes, actually drive each of us from moment to moment so that we are lost in thought—lost in our heads, caught up in emotional storms—and not actually living our lives in the only moment we ever have, which is now” (Paulson, Davidson, Jha, & Kabat-Zinn; 2013, p. 91).

While Kabat-Zinn is credited to being the first to bring mindfulness to western medicine, there is an entire scientific study around the ability of the mind to rewire the brain. In effect, we can exercise our mind and make it more focused. We all know that some people handle stress while others fail. Kobat-Zinn further explained that when people fall apart because of stress it really means they have exhausted their “capacity to willfully guide what their mind does... When this happens they switch to autopilot mode and lose mindfulness of behavior.” In other words they react to training, instinct, or random behavior. These reactions may not be appropriate or helpful to the present situation.

There have been few studies of pilots and mindfulness (Berthod & Müller-Seitz, 2017; Meland 2015; Weick & Robers, 1993). There has, however, been much research in other high stress jobs and industries centered on leadership and safety. The science of neuroplasticity—how well the brain is capable of forming new pathways--is well established field of academic and medical studies. Studies document the changes in the physical attributes of the brain because of meditation and mindfulness. I use mindfulness as a core principle in my book on wellness (Christensen, 2017).

If mindfulness is so powerful, how would one use its concepts in aviation? First, the culture of the community must be gradually changed, probably by leadership example and training. Mindfulness is strengthened by meditation. The more one practices meditation, the better one gets at mindfulness. But a study with US Marines heading for a deployment to Afghanistan showed that it takes a surprising small amount of daily meditation to have a measurable effect. Dr. Jha, a Professor of Psychology and Director of the Contemplative Neuroscience, Mindfulness Research, and Practice Initiative at the University of Miami, found that as little as 13 minutes a day made a significant difference when the Marines returned from their deployment. The trick was to get them to *commit to* meditation. Half of the study participants initially would not do the required time, but after witnessing the effects of meditation on those Marines that did, about half of the non-compliant participants began meditating in the field and showed excellent results.

The first step to teaching meditation is typically done by concentrating on the breath. This technique has the student concentrate on breathing in and out. He or she is trying to stay in the moment, noticing without judgement, blocking out all conscious thoughts. It sounds easy, but the mind gets bored and distracted quickly, so you have to continually bring the mind back to focus on the present. You are training your brain to focus on one thing (breathing) while ignoring thoughts and emotions of events in the past (distractions). When you're adept at concentrating on the breath, in Vipassana meditation for instance, one moves around one's body in square-inch increments until you can detect some sensation on that patch of skin, and then you move to the next. So it is an ,vigorous mental activity that increases the

ability to focus without distraction.. This fighting to keep your mind focused is what strengthens the mind. It's counter intuitive, but it works.

Once you learn to meditate by controlling your breathing, your mind associates the deliberate breathing as a call to focus, without judgement. A pilot, then can take a minute every hour of his or her flight to concentrate on breathing and focus. There are many apps for your personal device that reminds and guides you through a breathing exercise. This keeps the pilot in the moment and focused. If the crew is startled into awareness of an emergency, the shock will not be as great and the recovery, quicker.

What would happen in an emergency? In the moment of the terror, the pilot can take a quick deep breath, which tells the mind to focus. In this way, the shock is overcome and the multiple of stimuli can be handled with a clear focused mind. In pilot training, this was called "winding the clock." As you recall from the beginning, the three tasks in order are *aviate, navigate, and communicate*. I suggest adding meditate to the beginning: Meditate, Aviate, Navigate, and Communicate.

Of course, we cannot expect pilots to meditate in a crisis, but meditate is done daily as conditioning. When facing a stressful inflight situation, a deep cleansing breath while "winding the clock" should bring the training in to play. This seemingly unrelated action provides the time to fully come to the present.

Would mindfulness have worked for AF447? Who knows for sure, but the actions the pilots took, which stalled the aircraft, before they understood the situation (came into the present) did not help. The plane's instruments were working again within 29 seconds, but by then the plane was unrecoverable. In their review of the accident, Berthod and Müller-Seitz concluded, "Operators can prevent instinctive, emotion-driven reactions that could worsen the situation and increase its complexity. When reflecting on the pilots' situation in the cockpit, we cannot help but think about what would have happened, had they paused for a second before rushing to the joystick."

Resources

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