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Upset recovery training is often delivered in aerobatic category aircraft for maximum realism and impact. However, follow-on simulator sessions can enhance the value of this training. **Mike Reyno Photo**

CHANNELING ADRENALINE

STRESS PLAYS AN IMPORTANT ROLE IN UPSET PREVENTION AND RECOVERY TRAINING

BY KARL SCHLIMM

Stress is an inevitable part of flying, as it is in many other lines of work.

Unfortunately, chronic or long-term stress from meeting flight schedules, planning for weather, personal issues, and other factors can have lasting adverse effects on tasks that are critical to safe flying. Stressed pilots may have difficulty focusing on tasks, remembering information, or problem solving.

When chronic stress combines with acute stress—that is caused by loss of control in-flight (LOC-I) or another emergency—a pilot's ability to perform in that crisis can be degraded significantly.

THE PHYSIOLOGY OF STRESS

Our physiological response to a "stressor" (a stimulus that causes stress) includes the release of stress hormones such as cortisol and adrenaline. The relationship between these hormone levels and performance is in the shape of a Bell curve. Elevated levels of these stress-induced hormones enhance performance, but only up to a certain point. Our senses (vision and hearing, for instance) become heightened as stress levels increase, enabling us to perform better.

This response to stressors is designed to help the body adapt quickly to survive and eliminate the stressful stimuli—it is our instinctive "fight or flight" response. If we are being chased by a tiger, our physiological response to stress drives us to distance ourselves from that tiger, so that our stress levels can return to normal. In the aviation environment—for which the evolutionary process, as well as our current level of required licensing training, has inadequately prepared us—we can quickly be overwhelmed by unfamiliar events.

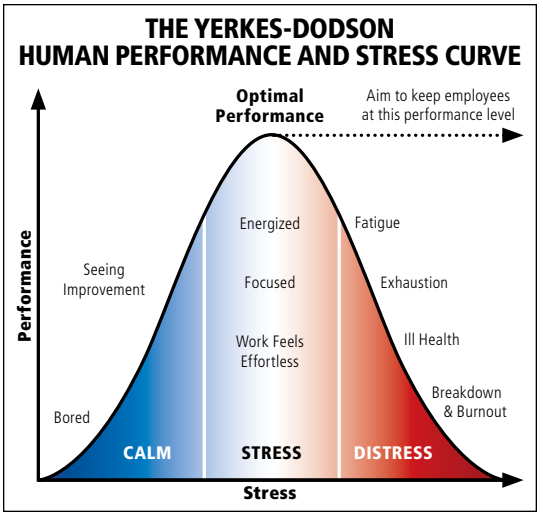
ADRENALIZED LEARNING

Studies have revealed that an individual's stress level is most affected by their perceived control over a situation. Pilots who routinely cope with stressful situations typically feel more in control, but confidence does not guarantee that a pilot will do the right thing in a crisis; proper training is critical.

"Adrenalized learning," a term coined by Rich Stowell, an FAA Master Certified Flight Instructor - Aerobatic, is synonymous with stress-enhanced learning in a training environment. A properly structured training environment should include realistic stressors while exposing the student to a diverse range of training events.

At Aviation Performance Solutions (APS), pilots undergo comprehensive upset prevention and recovery training (UPRT). This training is performed in aerobatic category aircraft, although follow-on simulator sessions at the customer's discretion can enhance the value of this training. In-aircraft training provides realism and a sense of urgency. In this adrenalized learning environment, pilots are taught essential life-saving upset recovery skills, while learning to respond to what they "see and feel" (e.g. the ground filling the windscreen and increased g-loadings) in a correct and timely manner. By learning to recover from a LOC-I event in the training environment, while dealing with realistic stress levels, that pilot will be better able to cope with stress in a "real-world" crisis.

ABOVE: Complex sensory cues such as a windscreen full of ground also produce stress, as the student must scan actively for the horizon to make correct decisions. **APS Photo**



THE ANATOMY OF STRESS-ENHANCED TRAINING

A properly structured UPRT environment will allow a pilot to progressively gain confidence as training tasks become more difficult. The classic "building block" approach to training is crucial, since this type of recovery training is typically unfamiliar to pilots and can be overwhelming if the instructor does not manage training complexity and stress well. Clearly, this is not an environment for inexperienced instructors. Exposing a pilot who has never been upside down in an airplane to an extreme nose-low inverted upset before his or her skill and confidence levels have increased can have lasting traumatic effects.

The student should be allowed to practice recovery skills in progressively more extreme conditions. For instance, most pilots have never been upside down in an airplane. The instructor could introduce a simple aileron roll, to expose the student to the all-attitude environment in 360 degrees of roll in a controlled "low-threat" fashion, before actual recovery skills in those flight regimes are practiced.

A loop can expose the pilot to 360 degrees of pitch in a similar controlled manner. Afterward, the student could practice cross-controlled stall recoveries, which would allow him/her to practice recovery skills in over-banked low airspeed conditions. The student could then be exposed to various low and high airspeed nose low overbanked upsets, culminating in progressively more dynamic and challenging attitudes and situations.

THE STARTLE FACTOR

Once a pilot has gained basic recovery skills and is confident, the instructor can introduce the "startle factor." Many loss-of-control in-flight events in the real world, such as a wake turbulence encounter, occur without warning. Introducing the startle factor in a training environment can help a pilot effectively cope with acute stress during such abrupt crises.

Realistic stressors are important in this type of training. Examples of stressors in the LOC-I training environment include sense of urgency, the reality factor of being in an airplane, heat, vibration, noise, increased g-forces, and ground proximity. Complex sensory cues such as a windscreen full of ground also produce stress, as the student must scan actively for the horizon to make correct decisions. The instructor can facilitate realism and training effectiveness by encouraging the student to visualize themselves in their aircraft, whether it is a Cessna 172 or Gulfstream IV. Although altitude and structural safety margins are paramount in any training environment, the instructor can use representative scenarios for realism and increased sense of urgency on the part of the student.

For a simulated wake turbulence encounter, the instructor could tell the student to imagine he is on final approach at 1,000 feet AGL, configured for landing. The instructor could then initiate a startling upset simulating wake turbulence and critique the student on his recovery within the context of the low altitude environment.

REAL-WORLD CRISES

The instructor must tailor the training to the student and maintain a positive training environment at all times, managing the stress presented. Longer periods of reduced stress as the instructor critiques the student pilot and builds confidence must always follow very short periods of high acute stress when practicing upset recovery. Too much stress can lead to overload, but the results of a successfully managed adrenalized training environment will be well worthwhile.

A pilot who undergoes such training will hopefully, when faced with an unexpected crisis, avoid panic and respond correctly to sensory cues, reacting quickly in a skilled manner to cope with the emergency. As a side benefit, proper training can instill long-term confidence in pilots about their ability to handle a crisis.

Karl Schlimm is director of flight operations at Aviation Performance Solutions (APS). Expanded versions of Skies *articles by APS are available at apstraining.com/skies. APS specializes in reducing the risk of loss of control in-flight globally through integrated upset prevention and recovery training solutions.*

DID YOU KNOW? PUSHING ON THE YOKE OR STICK UNTIL "LIGHT IN THE SEAT" (TO APPROXIMATELY A THIRD TO HALF A G) IN A LOSS OF CONTROL IN-FLIGHT EVENT CAN INCREASE AILERON EFFECTIVENESS, REDUCE ALTITUDE LOSS IF OVERBANKED, INCREASE STALL MARGIN, AND REDUCE ASYMMETRIC G-LOADING.