Stress & Pilots

HUMAN FACTORS APPROACH TO ACCIDENT MITIGATION

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ASEL AMEL ASES COM IR CFI-I

Human Factors

Human Factors

Human Factors is the study of how a pilot's performance is influenced by their environment

- the effect of cockpit designs
- temperature & altitude
- the functioning of the organs of the body
- the effects of emotions and attitude
- interaction and communication with others
- pilot's attitude, knowledge, and discipline and its effect on judgement and decision making

Disclaimer

- I am a physician
- Worse, I am a surgeon
- Even worse, I am a sub-specialty surgeon
- Totally unacceptably worse, I am a Bonanza / Baron flying surgeon

- Basically, I am already goners
- I am one of those “I am smarter than everyone else” overly educated no-good doctor pilots, with an MD PhD MBA CPE, pretend to be a pilot, who thinks they can reason with thunderstorms and outsmart an engine failure.

Truth or Bias?

- Experience
- Recency
- Get-there-itis
- Purchasing power
- High achiever jobs
- Weekend flyer
- Personality
- Can do anything / never been told no

- Not unique to physicians
- Some envy involved
- Caught on after V-tail bonanza crashes
- Flutter problem / design issue
- Nothing particular about doctors
- Dedication to transportation not aviation
- KISS is hard to do
- Confirmation bias every time an MD crashes

My story

- BENJAMIN
- LUFTHANSA CAPTAIN
- MY BEST AVIATION CRITIC
- KLM DEADLY TRAINING ACCIDENT
- MATT SULLIVAN
- HARRY HUTZ
- MIKE BOONE
- ASEL, ASES, AMEL, IR, COM, CFI-I

Why do only stupid pilots crash?

Confirmation bias

Selection or survivor bias

Obsessive analyses of all accidents

Most accidents are caused by pilot error

Stress

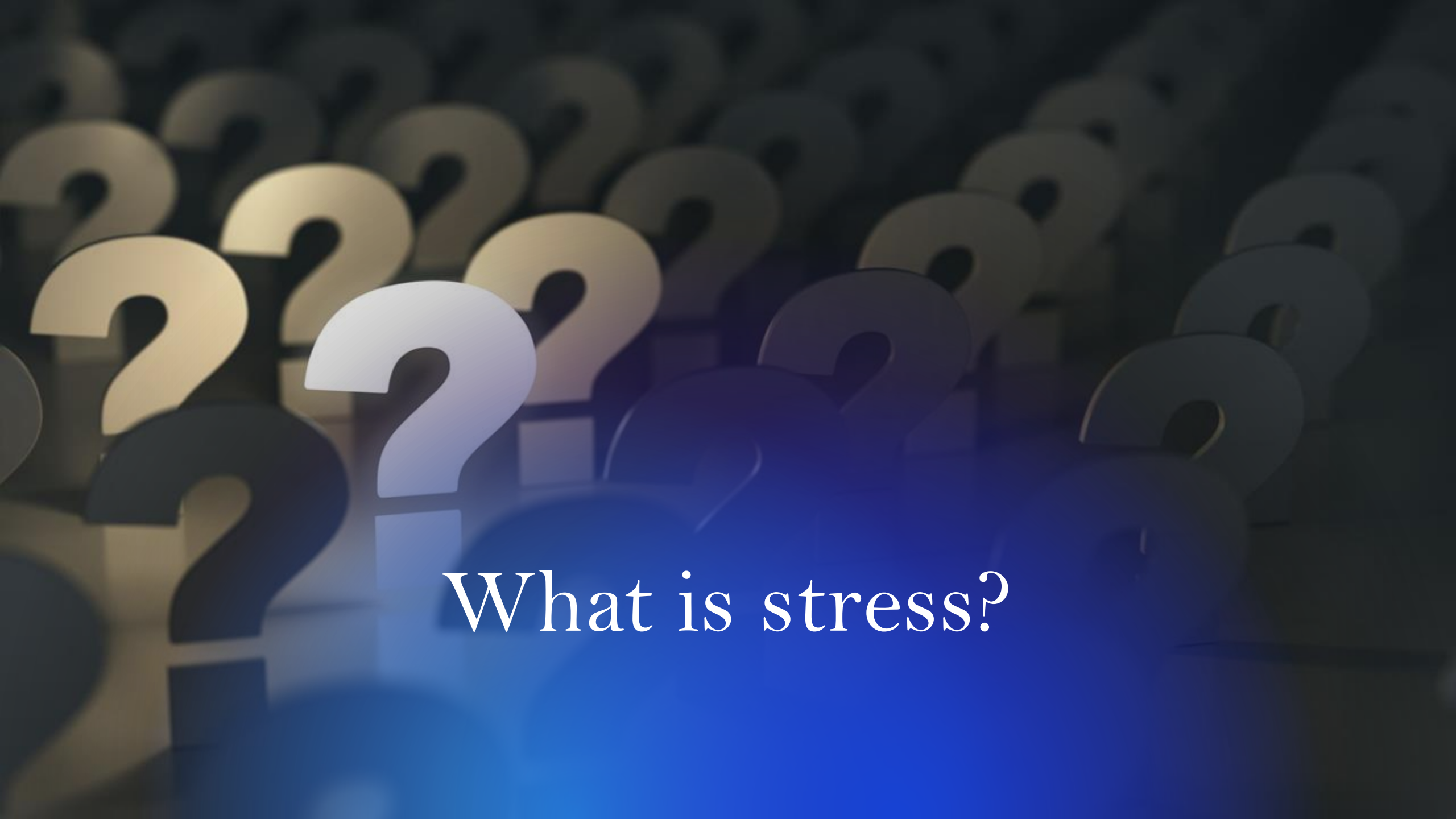
Listen to this pilot

Cirrus pilot engine failure

Survivor's Analysis

- My amazing preparedness through training others don't
- My "humblebrag" skill
- Undeniable great outcome as a result of the above
- My seasoned and sage advice for others
- Adulation by fellow aviators (Max Trescott et al.) and YouTube followers (Likes!)

- Did this pilot explain his brain response correctly?



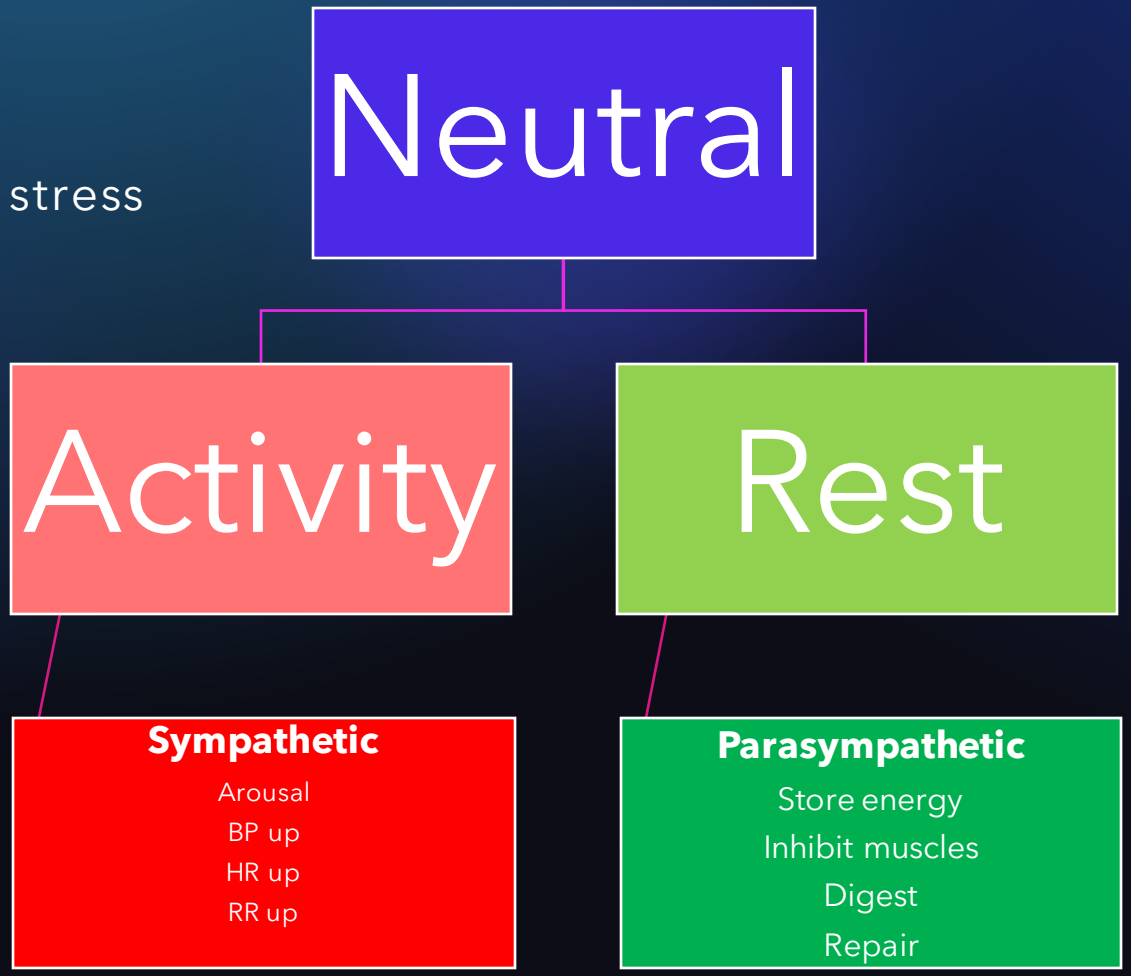
What is stress?

Association bias

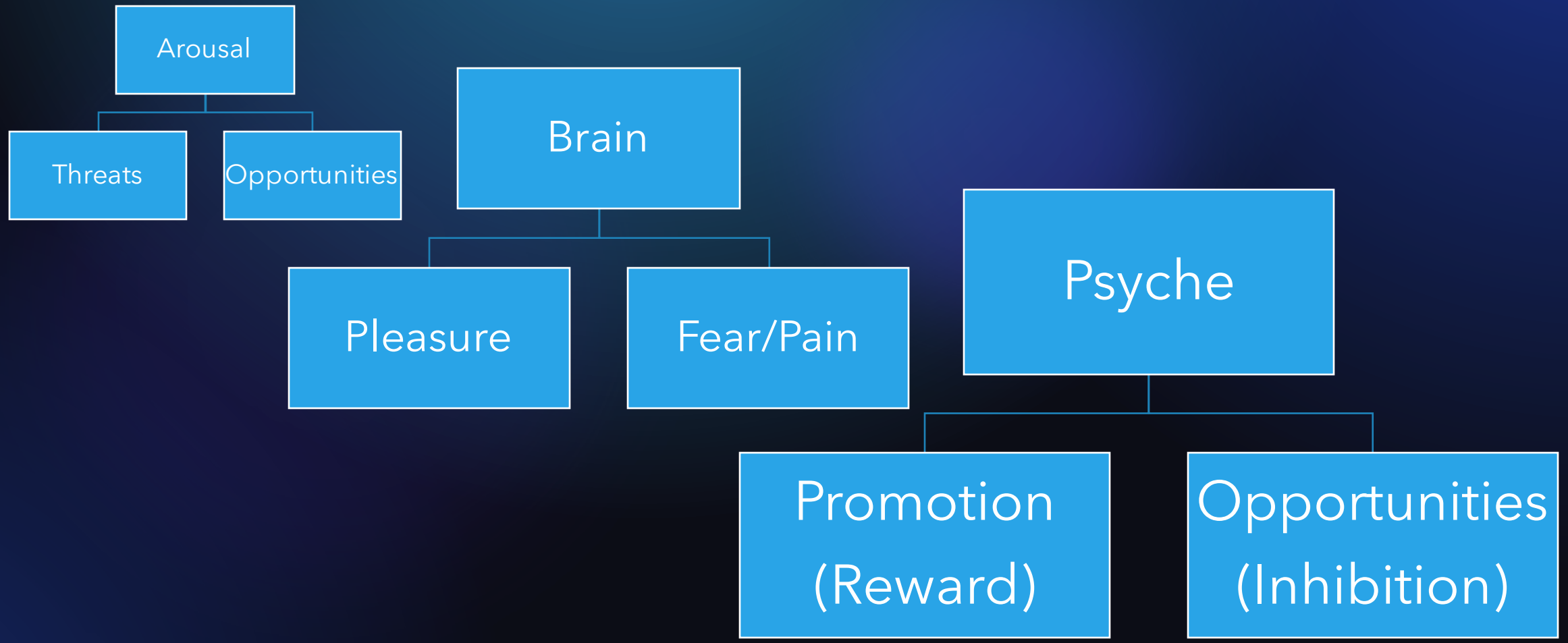
- Pain
- Fever
- Inflammation
- Vomiting
- Coughing
- Stress

Evolution of Stress

- By definition useful: Adaptive value of stress



Stress Evolution



Ubiquitous in Nature

- Pro-opiomelanocortin
  - ACTH (Adrenaline precursor)
    - HPA hormonal system (Hypothalamus, Pituitary, Adrenal)

Steroids and Opioids essentially

Found in:

All Vertebrates

Amphibians and Reptiles

Insects

Mollusks and Marine Worms

How is stress helpful?

Fight or Flight

- ↑ HR,
- ↑ RR and Depth of breathing, ↑ gas exchange
- Sweating to cool and make slippery
- ↑ Glucose levels
- ↑ Blood clotting
- ↑ Muscle tension

Why not always be stressed?

- Expensive in terms of calories
- Less time for finding food, eating and mating
- Tissue damage

- If a stress response prevents being caught as prey, this is always worth it
    - Even if substantial damage results from the stress response

- In nature, given the uncertainties of environmental cues and the potential life-saving effects of stress response, expression of stress is worthwhile, even though there is only a small chance that danger is actually present.

Stress side effects

- Tunnel vision
- Impaired analytical function
- Impaired problem solving

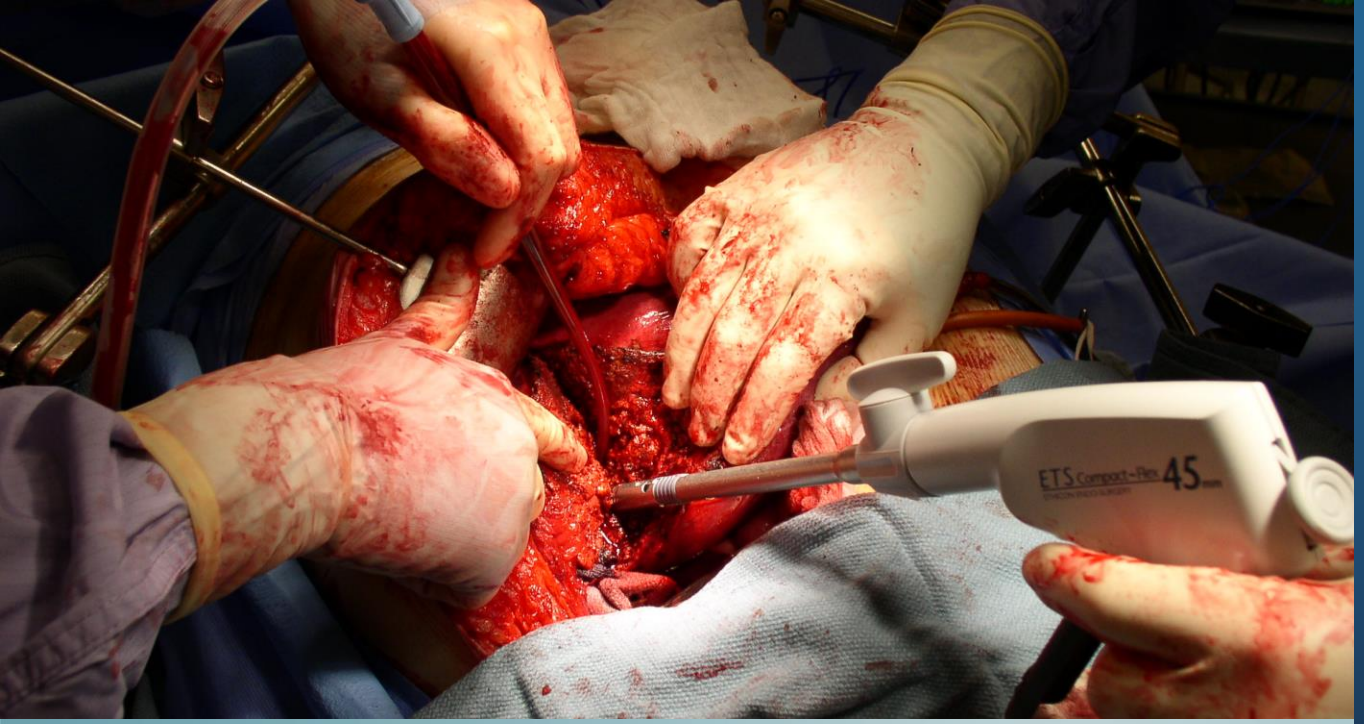
- Not very helpful for social and mental threats

Stress

Mismatch between demands made on an individual and that individual's ability to meet those demands

- Sometimes a proverbial tiger
- Sometimes our tendency to commit to personal goals that are too many and too high
- Sometimes you are stuck in a "mental maze"

When you are stuck in a maze, running around like a stressed chicken is not going to help you find your way out

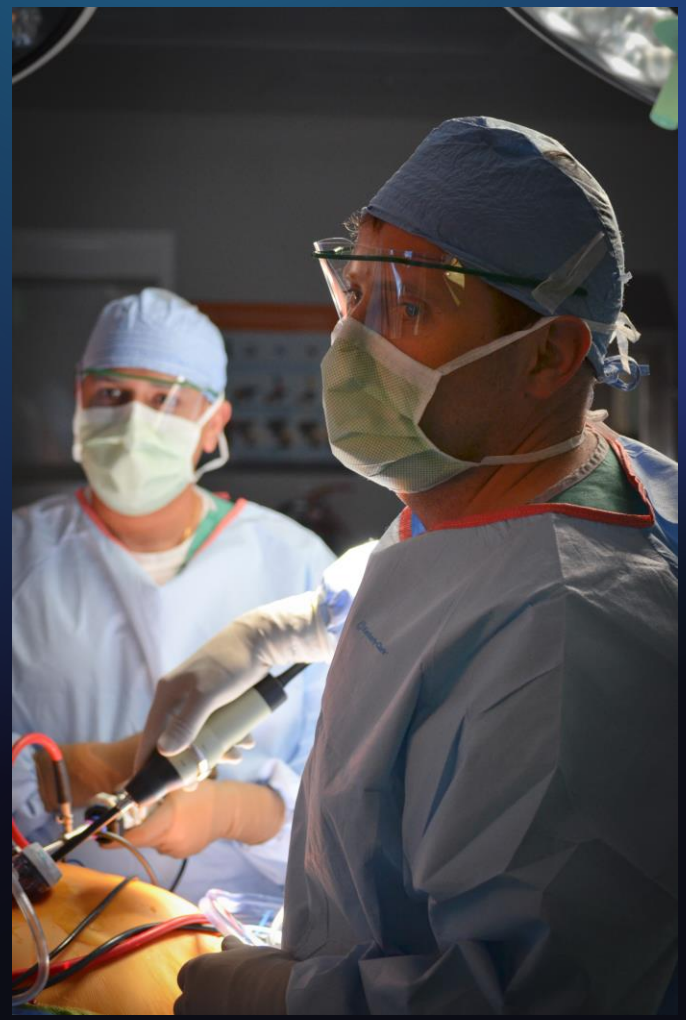


My experience with stress

- Stress in daily life
- Stress in episodes
- Work related stress
- Stress at work
- Professional stress management
- Aviation related stress
- Stressful aviation episodes

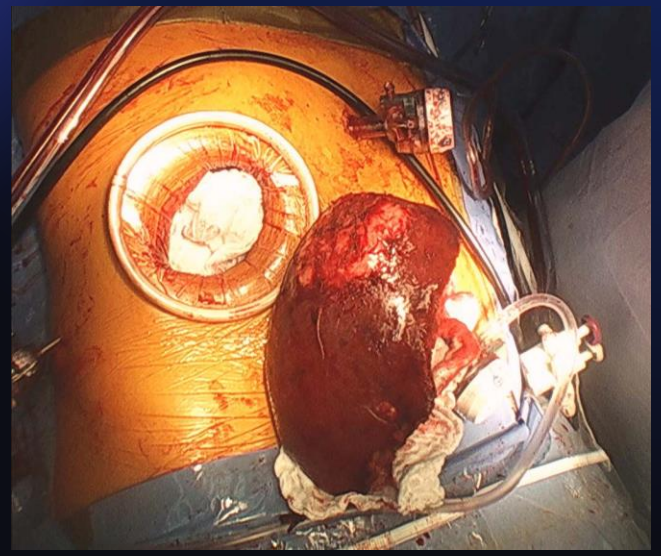
Training for Stressful Situations

- Not the same as stress training
- Recency
- Skill
- Automaticity
- Checklists



Stress Training

- Combat hardened / military training
- Surgical training
- Recognizing your own physiologic stress response
- Learned behavior in response to stress
- FAA fatalistic attitude training antidote
- “When the engine fails, ask for a cup of coffee”
- “Never run to a code”
- First thing an attending surgeon does when called into an OR Emergency?



Human factors in Medicine

- Human factors medicine / aviation

- Learning from each other is important to mitigate problems, accidents and deaths

Human factors lessons applied

- In 2006 Gawande et al.: 66% of all adverse events were found to be surgical in nature
  - Some confirmation bias, but indicative of the high stress and complexity of surgery
- Flow disruptions are most stressful
  - Flow is the state in which a person is fully immersed in a complex activity that is intrinsically motivated by his or her own talents and interests. It imparts a distorted sense of time and a loss of any feeling of self consciousness. Flow can only be attained if an individual possesses the proper skill set necessary to carty out a task.

- Impaired team work, communication failures, equipment or technology problems, extraneous interruptions and issues in resource accessibility leads to surgical errors.
- The number of minor events increasing, leads to decreased ability to deal with major events
- Most distracting were communications about equipment, other patients.

THE EMMENTAL CHEESE MODEL

Surgery adaptations

- Check lists before and after surgery
- Pre-op briefing
- Teamwork training courses (ATLS)
- Minimizing extraneous communications

Lessons from a Surgeon

- Learn to recognize your stress response physiology through deliberate training and practice
- Use active interventions to decrease stress, particularly when the stress is the highest
    - Lean out, release tension
    - "widen the retractors" → let go of the yoke
    - Take several deep breaths and exhale calmly, say out loud: What can I do better? Who can I call? What else could be going on? What are my alternatives?
    - Crack a joke, and release mental tension, even when nobody is listening
- Don't shy away from stressful training scenarios, but debrief and learn from them
- Learn all you can about your patient and patient's condition (or airplane, procedure etc)
- M&M conference (Discuss cultural pitfalls)

Let’s armchair review

- Who has a story?
- Did I change anyone’s mind?
- Did I add insight?
- Can you be critical without being mean?
    - Crash in Raleigh in the 80’s
    - EXX crash
- Can you celebrate success and still be critical of choices?
    - Miracle on the Hudson
    - Cirrus engine out

Listen to this pilot

Cirrus pilot engine failure

Summary

- Stress helps and stress hurts
- When you need your decision-making capabilities more than your fight and flight response, stress is hurtful
- Aviation is not a fright or flight kind of deal, stress hurts more than helps
- Training is paramount, simulation is helpful, check list support your brain when stressed
- No substitute for learning about your own stress response
- Train to be stressed, and learn how to respond. It may save your bacon one day.
- Dare to be critical, but don’t be mean. Invite / allow criticism, don’t be too sensitive