

# Human Factors Challenges with Smoke/Fire Events



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# Startle/ Surprise

- Startle is physiological and can be uncontrolled, sometimes referred to as a startle reflex.
- Surprise is psychological, a brief mental state, positive or negative.
- In this scenario the startle effect would be prevalent.



# Startle

- The startle reflex is a brainstem reflexory reaction to an unexpected stimuli that serves to protect the person and facilitates escape from the sudden stimuli.
- The Air France 447 accident report included Startle Effect as a causal factor.
- Initial and recurrent training programs as delivered today do not promote and test the capacity to react to the unexpected.



# Surprise

- A pilot becomes surprised when their expectations are inconsistent with reality beyond what can reasonably be expected from the cues available.



# Impairment Due to Startle Effect

- Psychomotor skills can be impaired for 5-10 seconds
- Not being able to accurately recollect and perform memory items
- Varying levels of cognitive disruption or cognitive dissonance that slows reaction time
- Fight or flight response/acute stress response



# FAA Simulator Study 2013

Jeff Schroeder, Chief Scientific and Technical Advisor to the FAA conducted startle event simulator research in 2013

Crews were briefed on expected stall recovery techniques to be performed in simulator

73% of crews performed the techniques properly

When unexpected tailwinds were inserted leading to a stall, only 22% correctly recovered from the stall event due to surprise



# Potential Human Factors Issues Related to Startle

- Tunneling or Fixation
- Difficult to re-think or re-engage
- Heuristics based on Cues and Assumptions ex. anchoring and representativeness



# Human Factors Challenges with Smoke/Fire Events

- Both pilots are wearing masks/goggles, which makes it difficult to see, to communicate, to move freely.
- CRM skills become a necessity as coordination has to be efficient and concise due to time demands. Get on the ground as quickly as possible.





# Thank You

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