

Emergency Stress: Improving Pilot performance during unexpected critical events

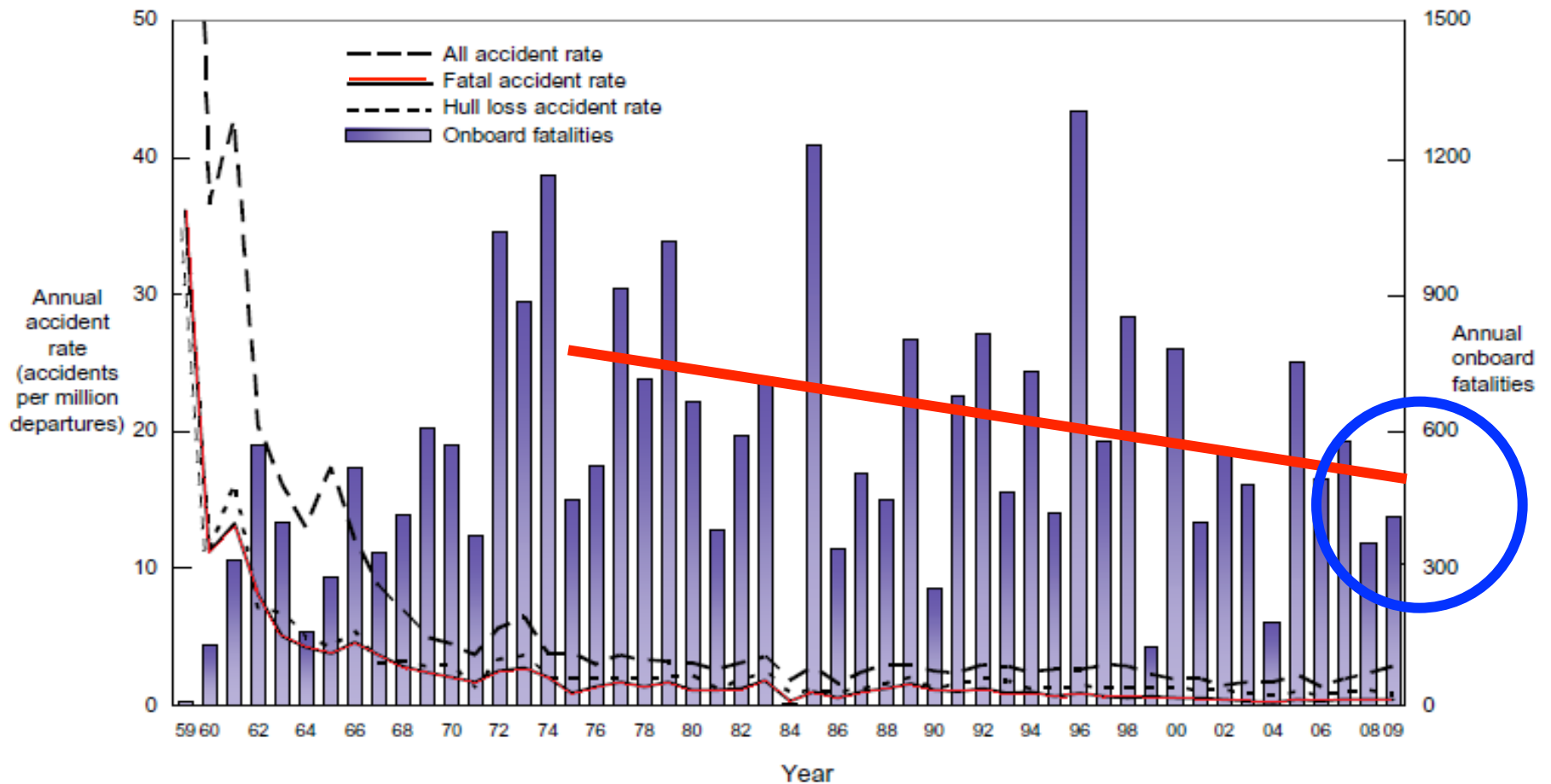


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Accident Rates and Onboard Fatalities by Year

Worldwide Commercial Jet Fleet – 1959 Through 2009



The curse of ubiquitous normalcy

The ubiquitous reliability of the modern aircraft has done tremendous things for airline safety.

One of the by-products of this tremendous reliability however, is a semi-realistic expectation amongst pilots that things will very rarely ever go wrong.

A conditioned expectation of normalcy

While Pilots may practise emergencies in a simulator for perhaps an average of four days a year, the remainder of the 360+ days are often routine and emergency-free.

On those rare occasions when things do go wrong, then a lack of expectation and sense of self-efficacy can produce some heightened stress reactions, with negative outcomes on situation outcome.

Some recent examples of unexpected events

Turkish Airlines – Amsterdam 2009



Some recent examples of unexpected events

Colgan Air – Buffalo 2009



Some recent examples of unexpected events

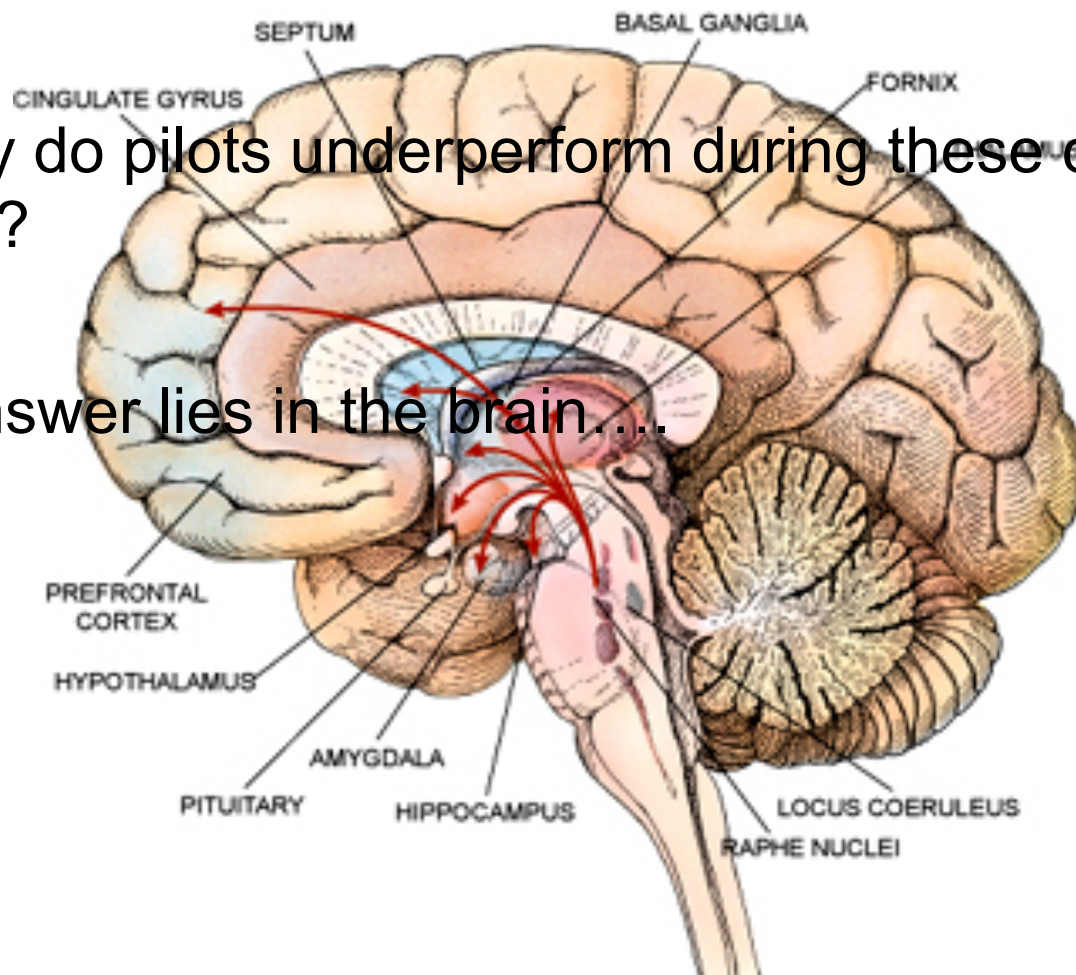
Air France – Atlantic Ocean 2009



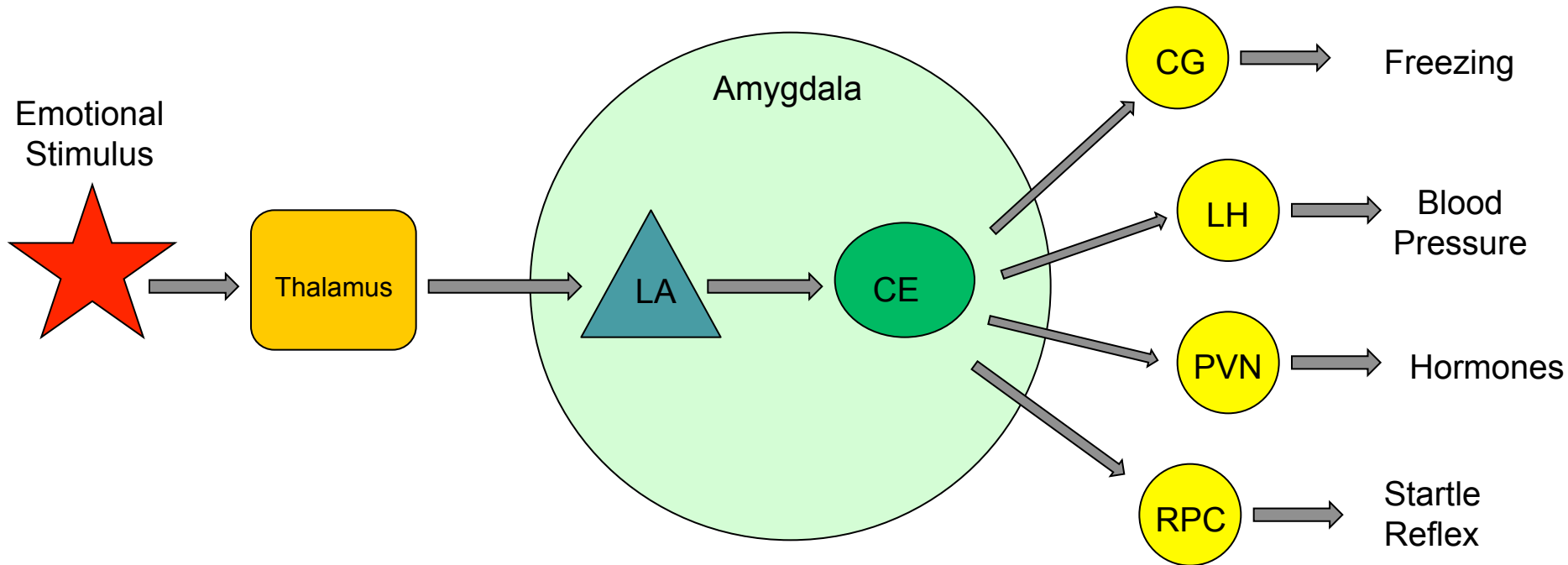
Emotional Response in the Human brain

So why do pilots underperform during these critical events?

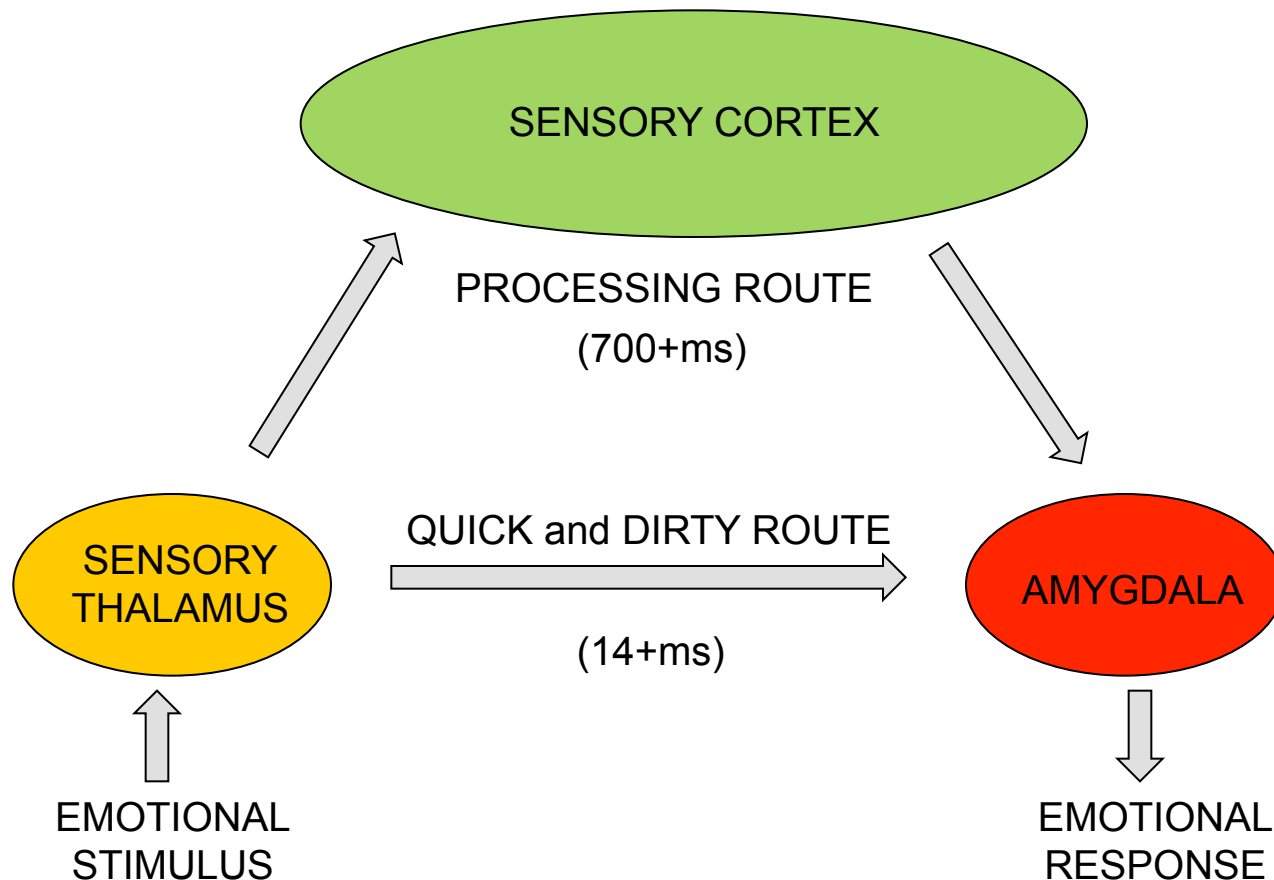
The answer lies in the brain....



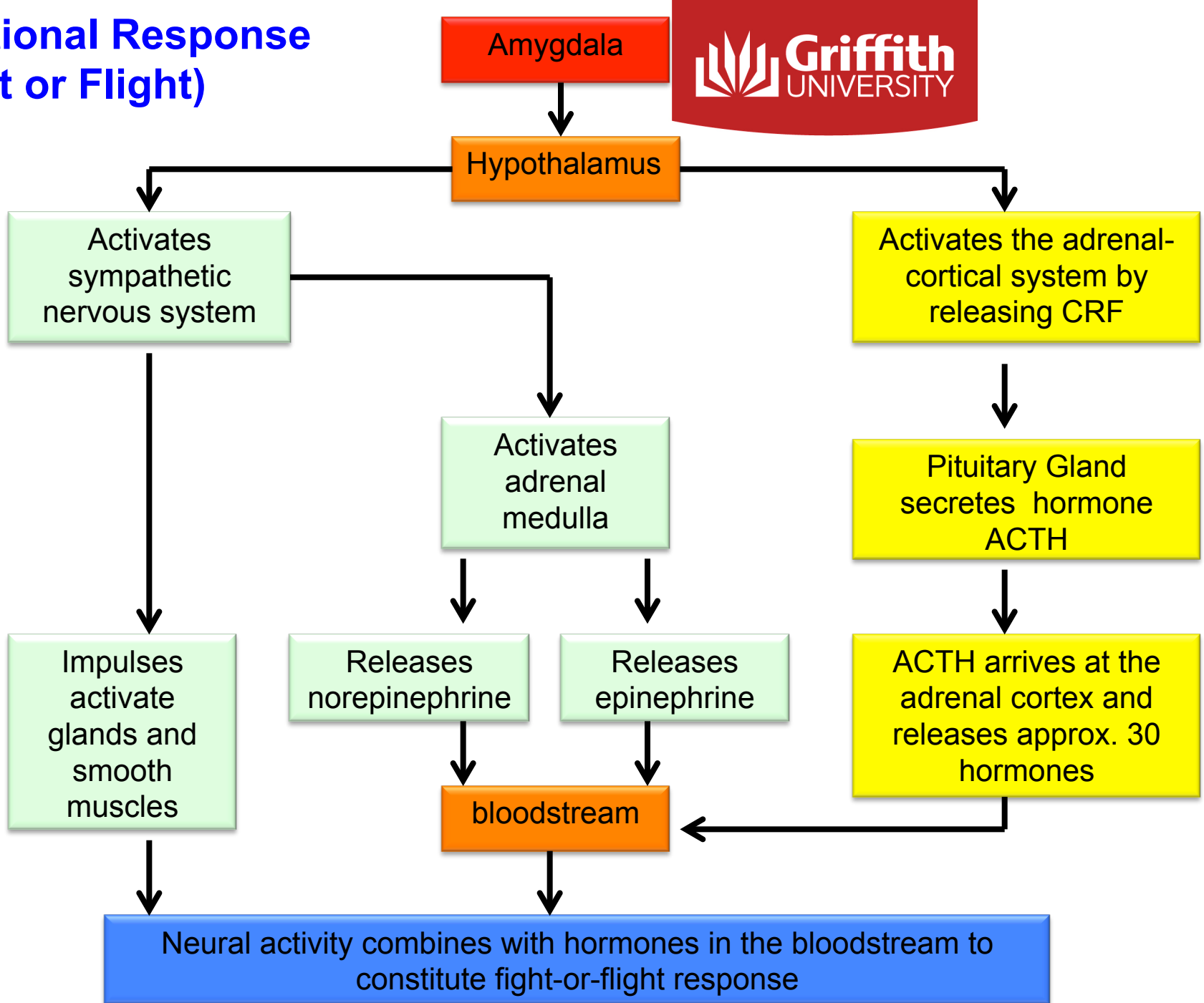
Emotional Response in the Human Brain



Emotional Response in the Human Brain



Emotional Response (Fight or Flight)



Emotional Response in the Human body

Activation of the sympathetic nervous system then has the following effects:

- dilates the pupils and opens the eyelids
- stimulates the sweat glands
- increases the heart rate
- opens up the bronchial tubes of the lungs
- inhibits the secretions in the digestive system
- creates auditory exclusion and tunnel vision
- dilates the blood vessels in large muscles (300% increase in blood flow)
- constricts the blood vessels in the rest of the body
- **diminishes processing in the frontal cortex**

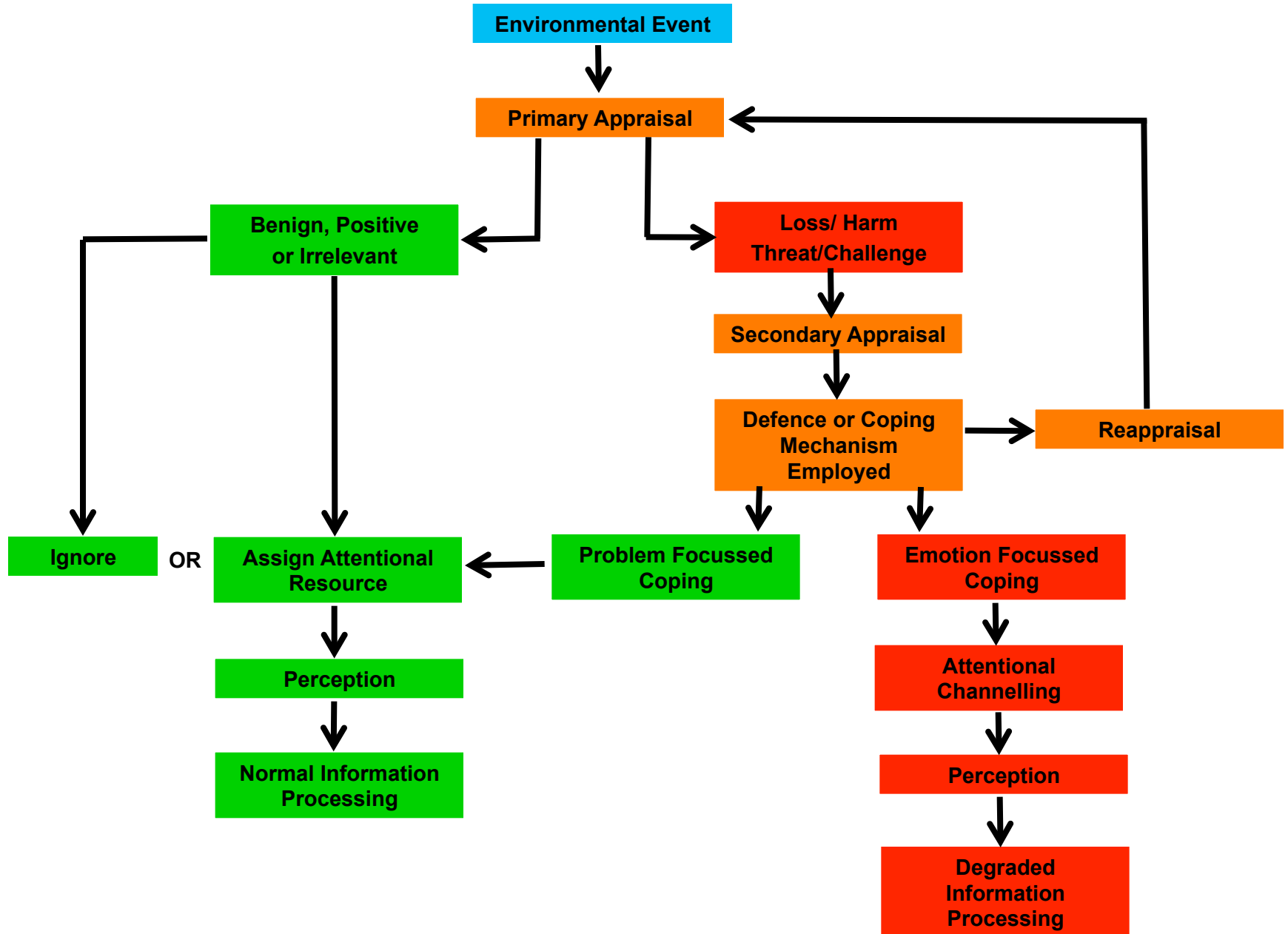
Dynamic Mortality Salience

Mortality Salience is:

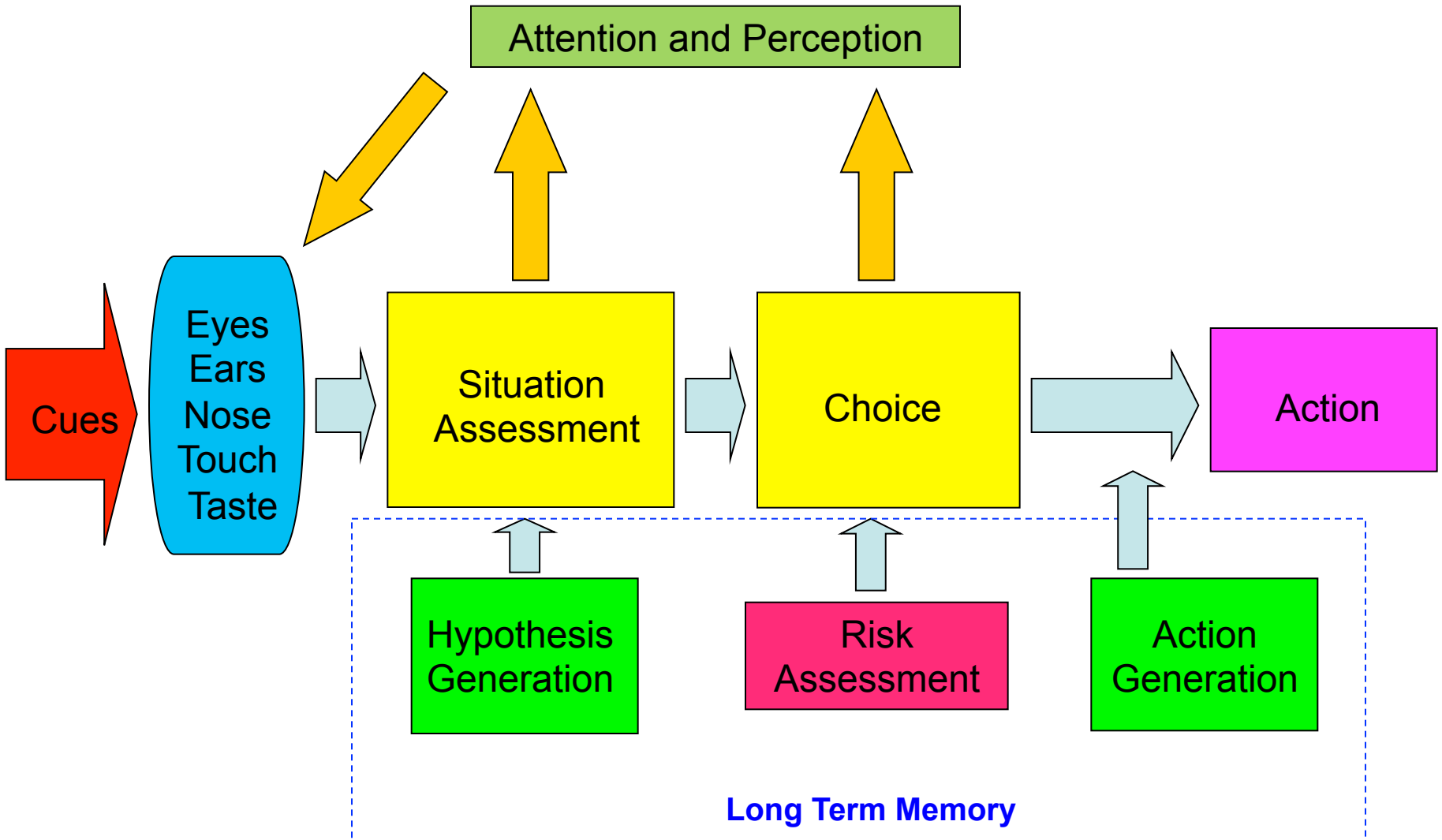
‘the enhanced awareness that people engaged in dangerous tasks have of the likelihood of personal injury or death’

In the context of an aircraft emergency, this realisation presents itself as an appraisal that a situation is life threatening or potentially ‘harmful’.

A Conceptual Model of Appraisal and Information Processing



NATURALISTIC DECISION MAKING



REDUCING PATHOLOGICAL STRESS EFFECTS

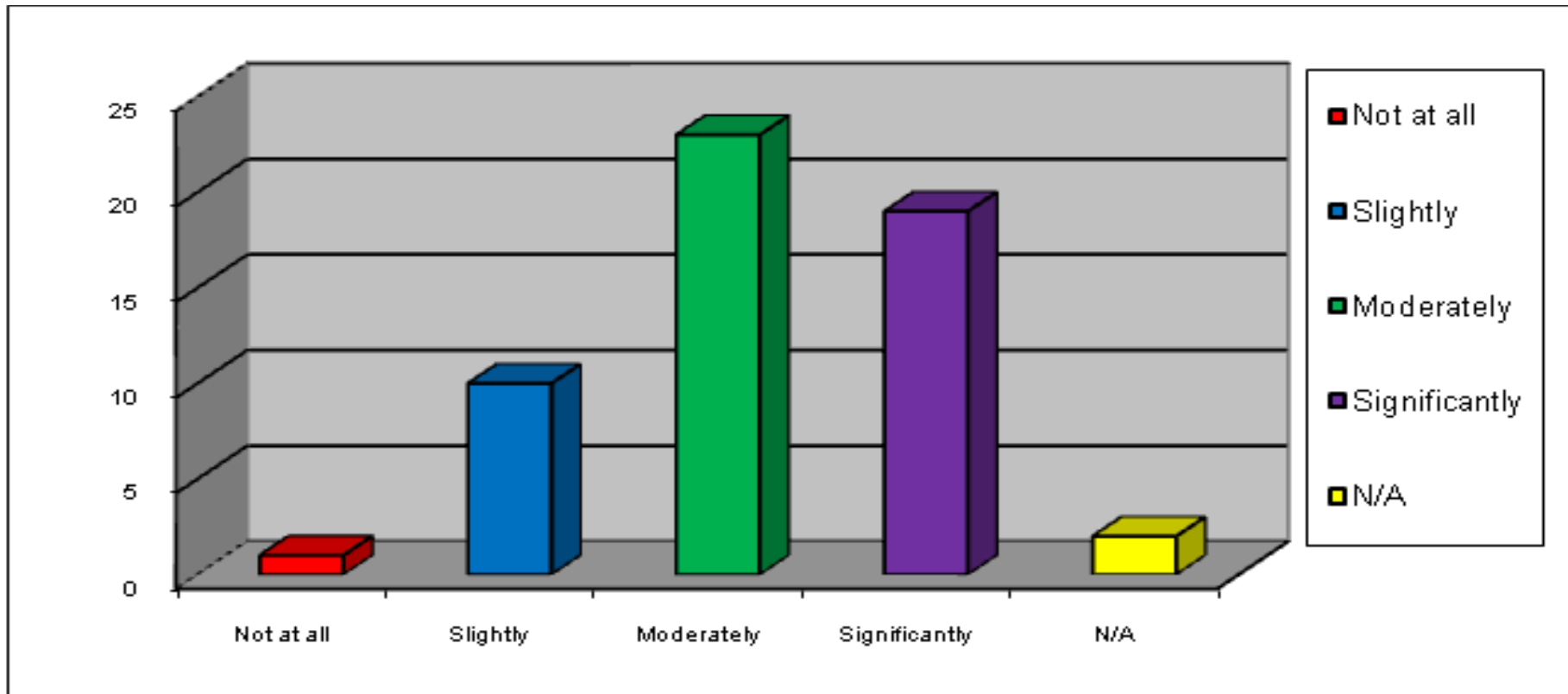
So how do we improve performance under acutely stressful conditions?

- By increasing level of expectation
- By increasing knowledge breadth and depth to allow more experiential based choices during naturalistic decision making
- By increasing sense of efficacy and thereby engendering more positive appraisals

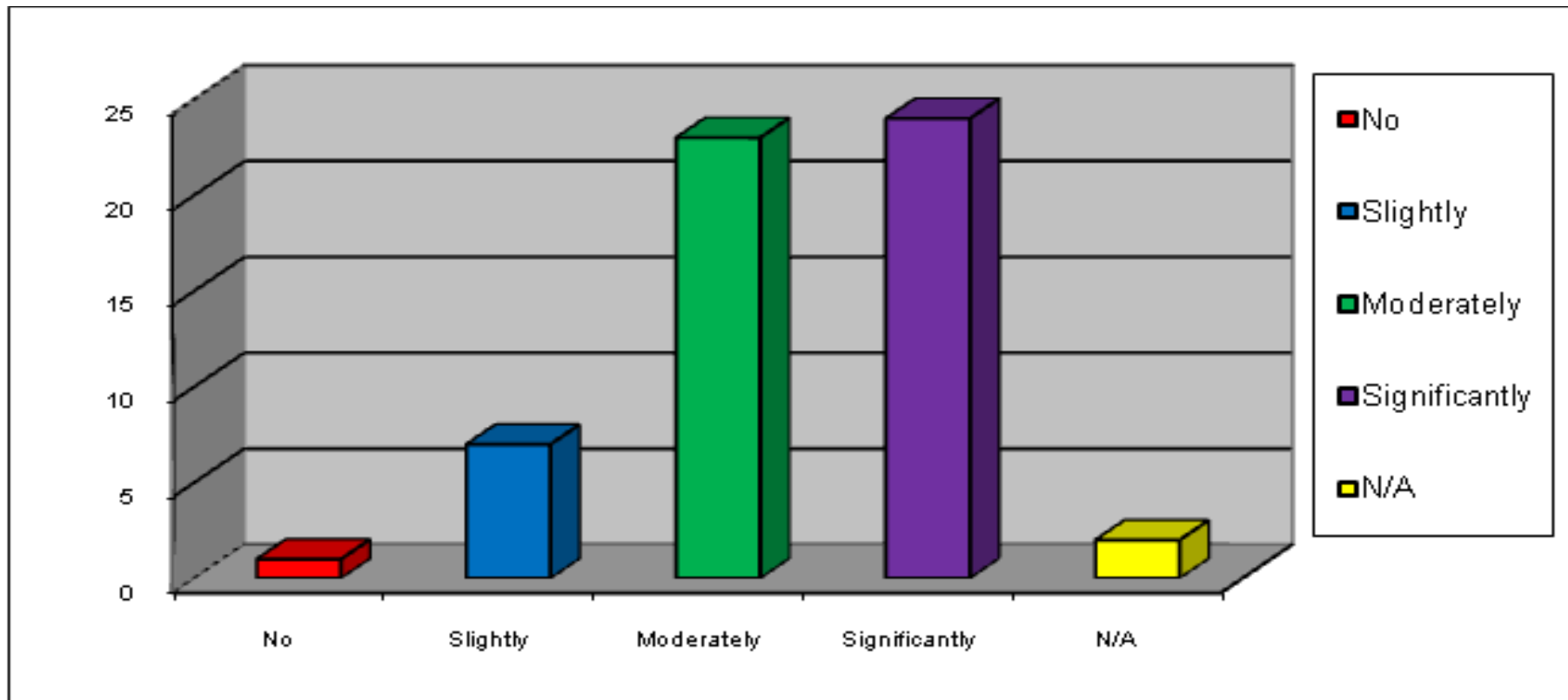
What would you do if....?

- A ten week pilot study at a New Zealand based International Airline
- Designed to gauge attitudes to scenario based discussions of novel and emergency inflight events
- Participants encouraged to discuss during quiet periods in the cruise, what they would do if something unusual and/or unexpected happened
- Very positive results

Do you think that these discussions have raised your expectation level for surprise events?



As a result of these discussions do you think that you would be better prepared to handle one of these novel or emergency events if it happened unexpectedly?



Summary

- The ubiquitous reliability of the modern aircraft engenders a conditioning toward an expectation of normalcy.
- The key to overcoming pathological stress effects arising from this conditioned state, is to increase expectation and efficacy amongst the pilot group.
- While scenario based learning is common in military and training operations, a change in pilot culture is needed to make this common place in normal line operations.

Summary

- Interventions such as IATA's ITQI / EBT are starting to focus training interventions on the type of events that do occur most regularly in modern aircraft.
- As well as the common problems, these types of initiatives also allow pilots to practise managing 'black swan' or rare event scenarios, and to develop some strategies for dealing with unusual events.
- Holistically applied initiatives to develop Pilot efficacy and management capabilities can only have positive effects on performance under stress.



QUESTIONS?