

# Mitigating the Effects of Startle During Critical Events

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# Fear-potentiated Startle

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A startle which has been enhanced by  
perceived or actual threat

## Startle and Acute Stress

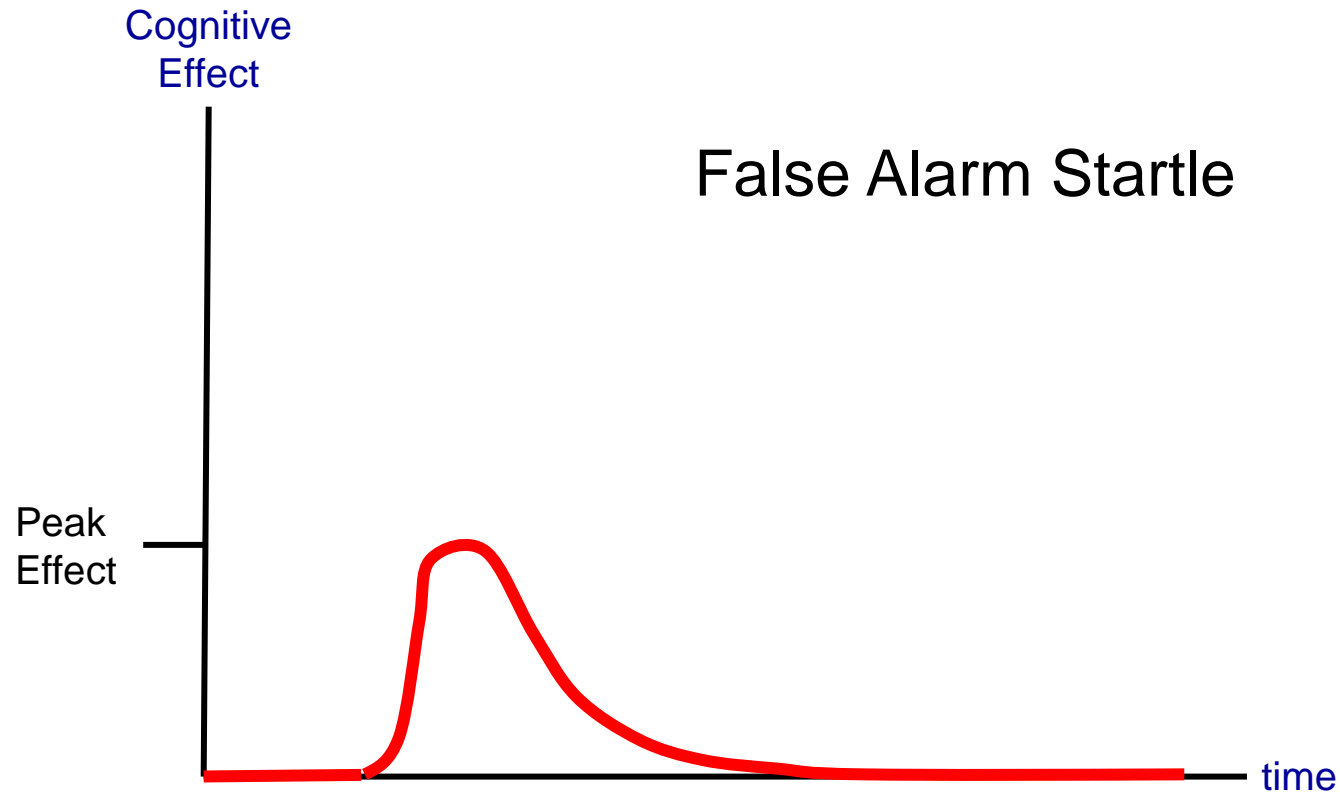
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Surprising stimuli with a level of threat associated, such as during an unexpected critical event, have the ability to engender an enhanced startle known as 'fear-potentiated startle'

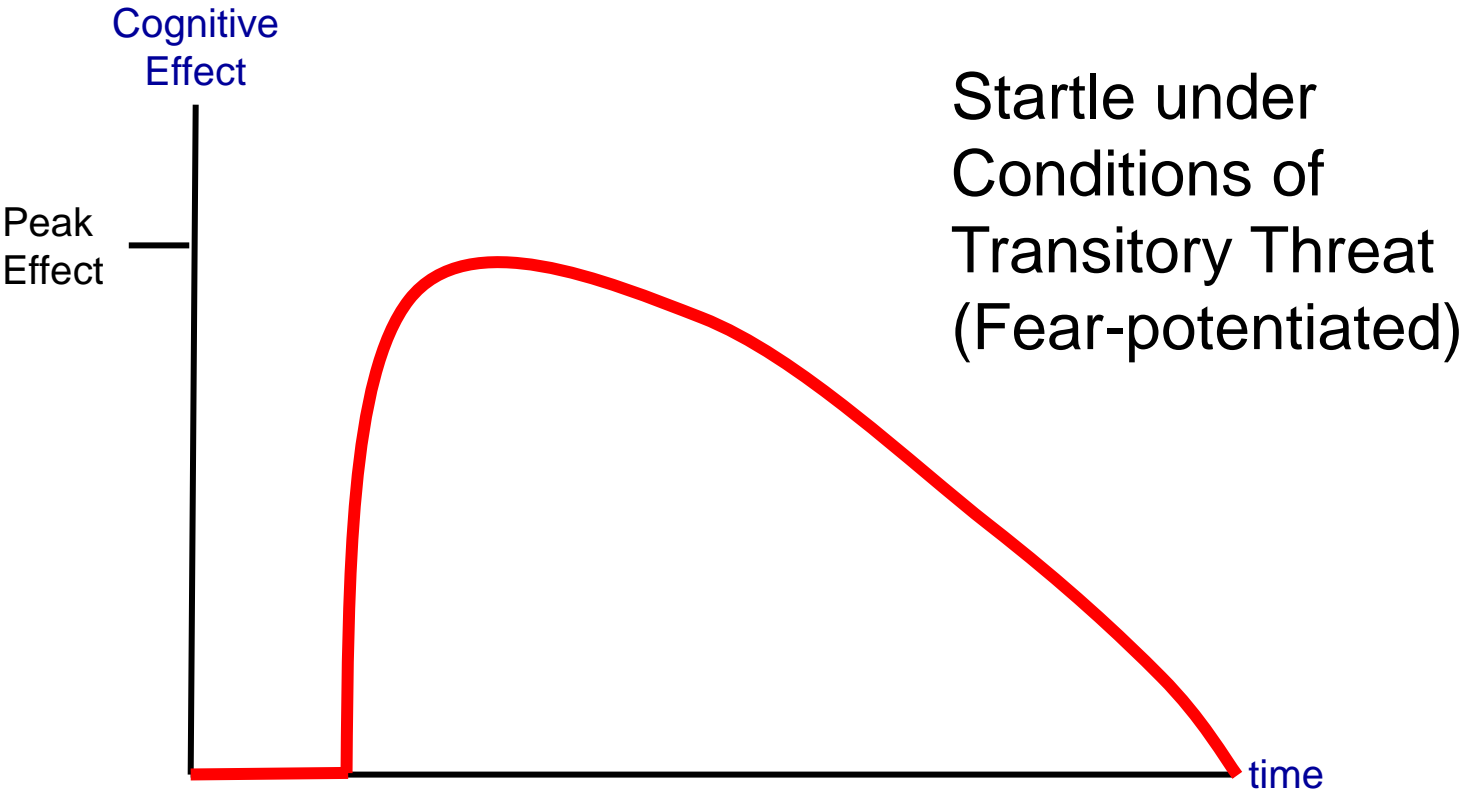
This enhanced startle involves three simultaneous processes within the body:

1. The startle reflex
2. The fight or flight reaction (adrenaline, heart rate)
3. The activation of the HPA axis (acute stress response)

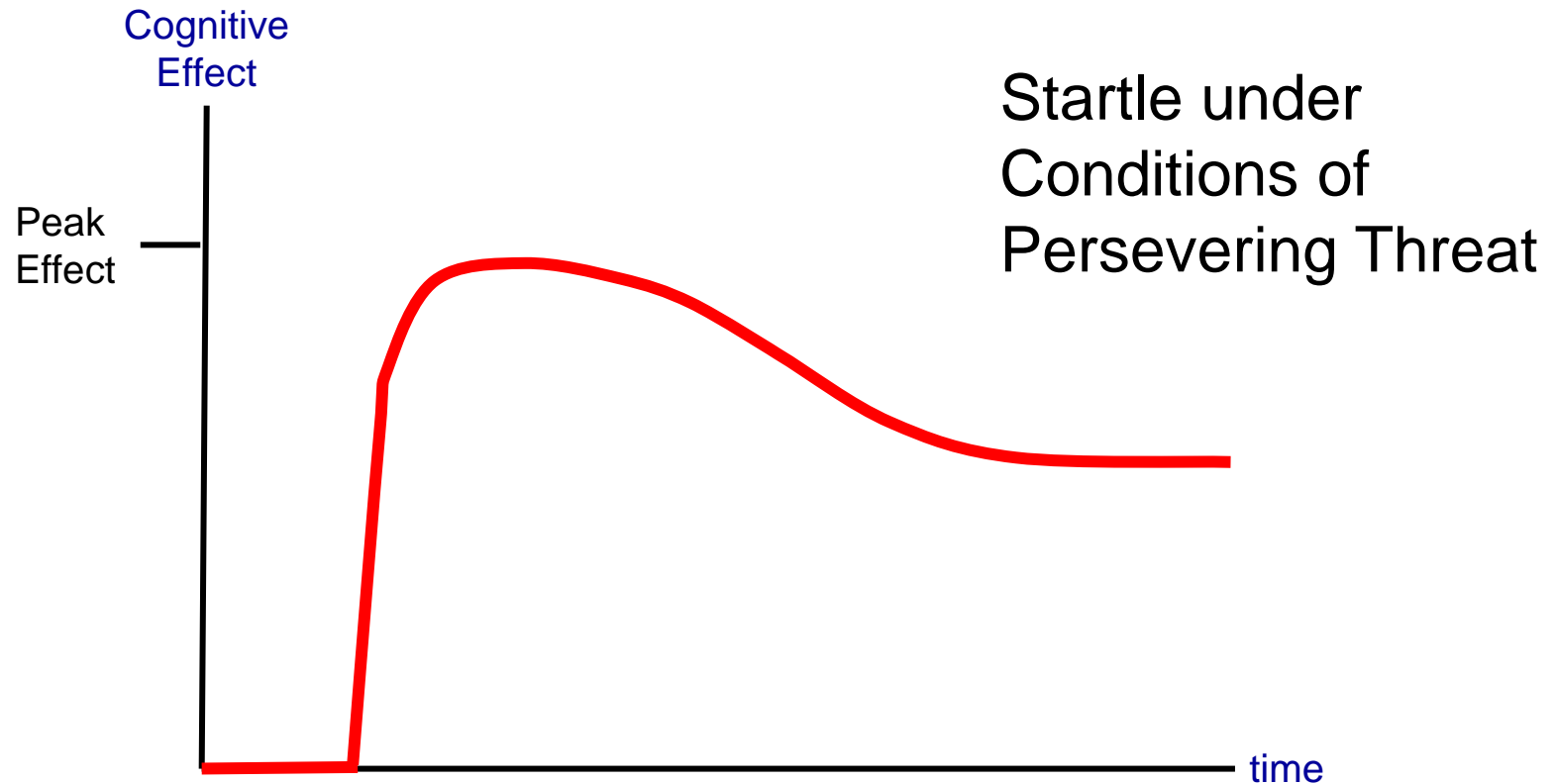
## Conceptualisation of Startle Magnitude



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# Self-Efficacy



‘The belief in one’s capabilities to organise and execute the sources of action required to manage prospective situations’

Bandura (1986)



## Why is there a problem?

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Ultra reliability generates a conditioned expectation for normalcy

Pilots are only exposed to non-normal events a few days each year – the rest of the time they are conditioned to expect normal operations by the sustained absence of critical events

A lack of expectation dilutes the perceived necessity for individuals to mentally rehearse action plans for critical events

Lack of expectation has been shown to increase the level of startle when some surprising event occurs

## Mental Schemas

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Mental schemas, or ‘cognitive action plans’ may become weak memories because they are revisited infrequently

The inability to accurately recall these schemas under acute stress and startle can result in significant and possibly critical performance degradations at a time when they are most needed.

## Cognitive Effects of Startle



Research has shown significant impairment in information processing for up to 30 seconds

Information processing tasks such as attention, perception, situational awareness, problem solving and decision making can be markedly impacted.

Communication is often disorganised and incoherent for some time.

Psychomotor impairment often occurs but generally lasts for only 5-10 seconds.

## Self-efficacy – Why is there such a difference between individual responses?

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At the heart of the acute stress response is an appraisal that a situation is threatening and is beyond the immediate control of the individual

Self-efficacious individuals who have an ‘action plan’ schema which is a strong memory and is therefore more easily recalled, are far more likely to perform well during unexpected critical events

Self-efficacy is derived from sound technical knowledge, from regular mental rehearsal, and from a healthy suspicion for abnormalities

## Individual Strategies for Improving Startle Performance

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- Sound technical knowledge with regular revision
- Effective situational awareness skill-sets, including monitoring
- Having a healthy expectation and suspicion for things going wrong
- Effective threat and error management strategies
- Mental rehearsal of 'action plan' schemas for both common non-normal events, and for 'black swan' type events (what would I do if....)

## Crew Strategies for Improving Startle Performance

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- Effective teamwork, communication and monitoring skill-sets
- Constructive scenario discussion in low workload periods (what would **you** do if...)
- Effective crew threat and error management practices

## Organizational Strategies for Improving Startle Performance

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- Pilot recruitment (eg. self-efficacious, not trait anxious)
- A constructive culture of professionalism
- Simulator exercises which are conducted in a constructive manner, allowing pilots to feel a sense of ‘mastery’
- Encouragement/SOP’s for scenario discussions on the line
- A focus on evidence based training (most likely events)
- Constructive use of unexpected critical events during training
- Improved training on avoidance, recognition and management of undesired aircraft states (including monitoring skill-sets)

Thank you