

Human Performance & Limitations - Module I — Rhythms & Resilience

Stress, Fatigue & Arousal

Chapter 23 — The well-being of operational personnel: arousal and performance, the sources and effects of stress, environmental tolerances, managing stress, life-event scoring, and the danger of acute and chronic fatigue.

BOOK

Human Performance & Limitations

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EXAM

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CHAPTER

23 of 26 · Module I

GHOST AVIATOR



Plate 23.0 — Stress sharpens the mind — until it doesn't. Beyond the peak, attention narrows and fatigue erodes every margin.

22. Stress Tolerance, Fatigue & Arousal — Well-Being of Operational Personnel

WHAT THIS SECTION COVERS

Stress, arousal, fatigue, environmental tolerances, life stress scoring, stress management, and the arousal-performance relationship.

Three of the many factors which may influence the well-being of operational personnel are:

1. Stress and fatigue
2. Body rhythm disturbance
3. Sleep deprivation or disturbance

Other factors affecting physiological or psychological well-being include: *temperature, noise, humidity, light, vibration, workstation design and seat comfort.*

22.1 Stress, Arousal and Performance

The different stress levels generated within individuals by a particular stressor will differ. A **moderate level of stress may improve performance**. Stress promotes an **increase in physical strength** rather than promoting mental performance.

- The response of a person to the event or circumstances to which he is exposed is known as **arousal**.
- Arousal is a measure of a person's **readiness to respond effectively** to a given stress factor.
- Personality, character, training and experience will influence levels of arousal in a given individual.

GHOST AVIATOR

22.2 The Effects of Stress

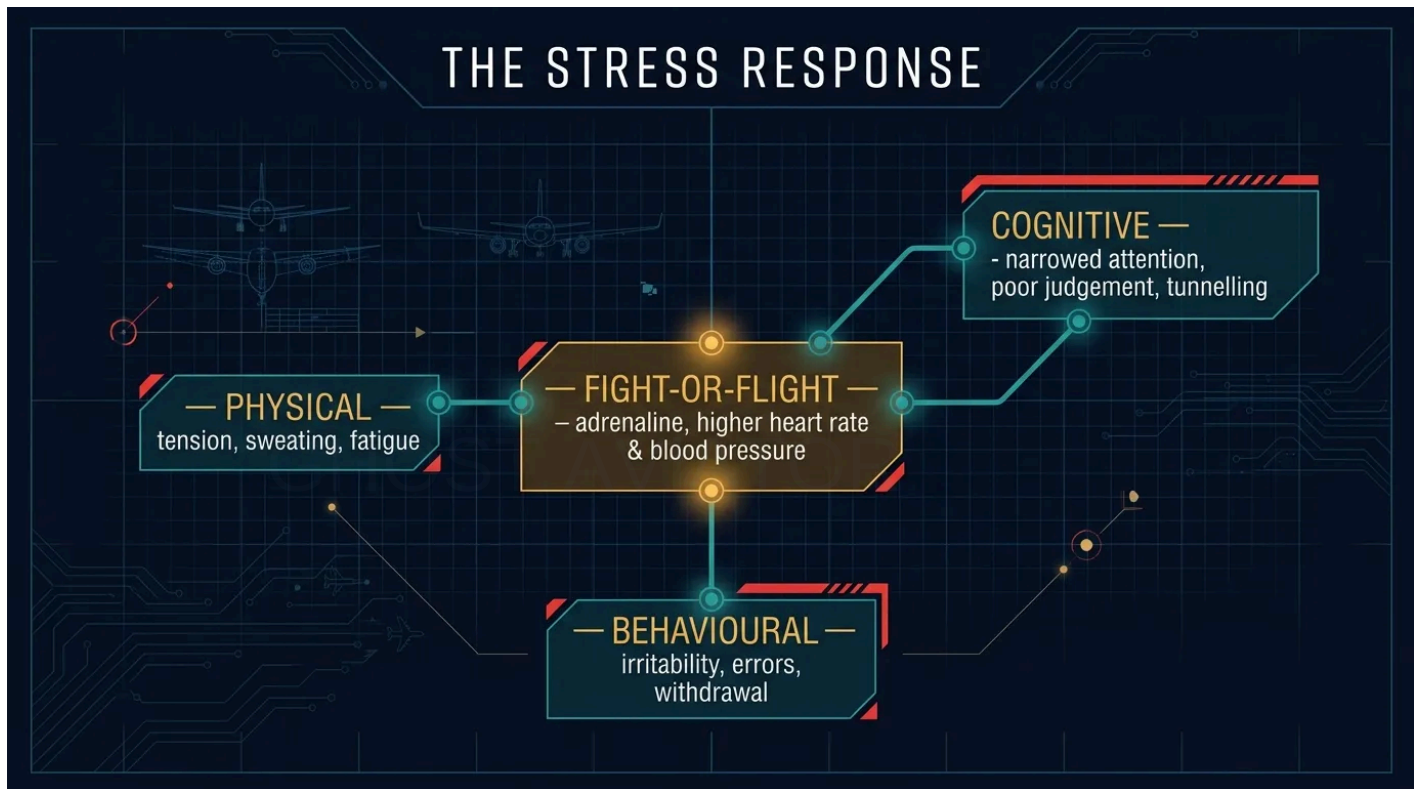


Figure 23.2 — The stress response: the fight-or-flight surge and its physical, cognitive and behavioural effects on the pilot.

In an active, outward-going, highly trained person, *too little* stimulation or stress arousal will lead to the onset of **boredom and even drowsiness**. An introspective, under-confident person, if highly aroused, might be unable to function at all — even in circumstances that he is competent to deal with.

22.3 Stress Factors (Stressors)

Stress factors are **cumulative**. Stress occurs under various conditions:

- Pilot must revise his plan of action and does not immediately have a solution
- Inexperienced pilots when situational demands exceed their individual capabilities
- Pilot is convinced he will not be able to find a solution to the problem
- Physiological factors — hunger, thirst, pain, lack of sleep, fatigue

SOP — KEY TO REDUCED WORKLOAD

Thorough flight planning is the key to reducing cockpit workload.

22.4 Environmental Tolerances

Temperature, pressure, humidity, noise, time of day, light and darkness can all be reflected in performance and also in well-being. Heights, enclosed spaces, and a boring or stressful working environment can also influence performance.

22.5 Managing Stress

Recognising stress, accepting it and developing a coping strategy is essential for stress management. Training and experience help to ward off stress and high levels of arousal. Successful completion of a stressful task will reduce the amount of stress experienced when a similar situation arises in the future.

SOP — STRESS SELF-MANAGEMENT

To avoid stress, know your limits and fly well inside them. If you are aware that you are under stress, consider whether it would not be wiser for you to stay on the ground rather than to fly when you are not up to it. Make sure that **cockpit housekeeping** is of a high order and that all documents, charts and associated equipment are appropriately stored and accessible. **High-quality headsets** will reduce cockpit noise levels. Temperature can often be regulated using the cabin heating or ventilation system.

22.6 Life Stresses — Psychological Scoring

Pilots suffering from life stress should be aware that this can affect their concentration and performance when at the controls of an aircraft. The descending order in which the factors affect a person:

Death of spouse/child → Divorce → Marital separation → Death of a close family member → Injury / illness → Marriage → Loss of job → Retirement → Pregnancy → Sexual problems → Birth → Change of financial status → Siblings leaving home → Change of eating habits → Change of residence → Loan/debt/mortgage → Vacations → Minor violations of law.

GHOST AVIATOR

Life Event	Score
Death of a spouse or partner	100
Divorce	73
Marital separation	65
Death of a close family member	63
Personal injury or illness	53
Loss of job	47
Retirement	45
Pregnancy	40
Sexual problems	40
Son or daughter leaving home	29
Change of residence	20
Bank loan or credit card debt	17
Vacation	13
Minor law violation	11

Cumulative Score	Interpretation
< 60	Free of life stress
60 – 80	Normal life stress
80 – 100	High life stress
> 100	Under serious life stress

Note: such schemes need to be treated with caution because of wide individual variability.

22.7 Indications of Stress

Stress causes: **mental blocks, confusion, channelized attention, resignation, frustration, rage, deterioration in motor coordination, high pitch voice and fast speaking.**

EASILY OBSERVABLE INDICATIONS OF STRESS

Perspiration, flushed skin, dilated pupils and fast breathing.

22.8 Tiredness and Fatigue

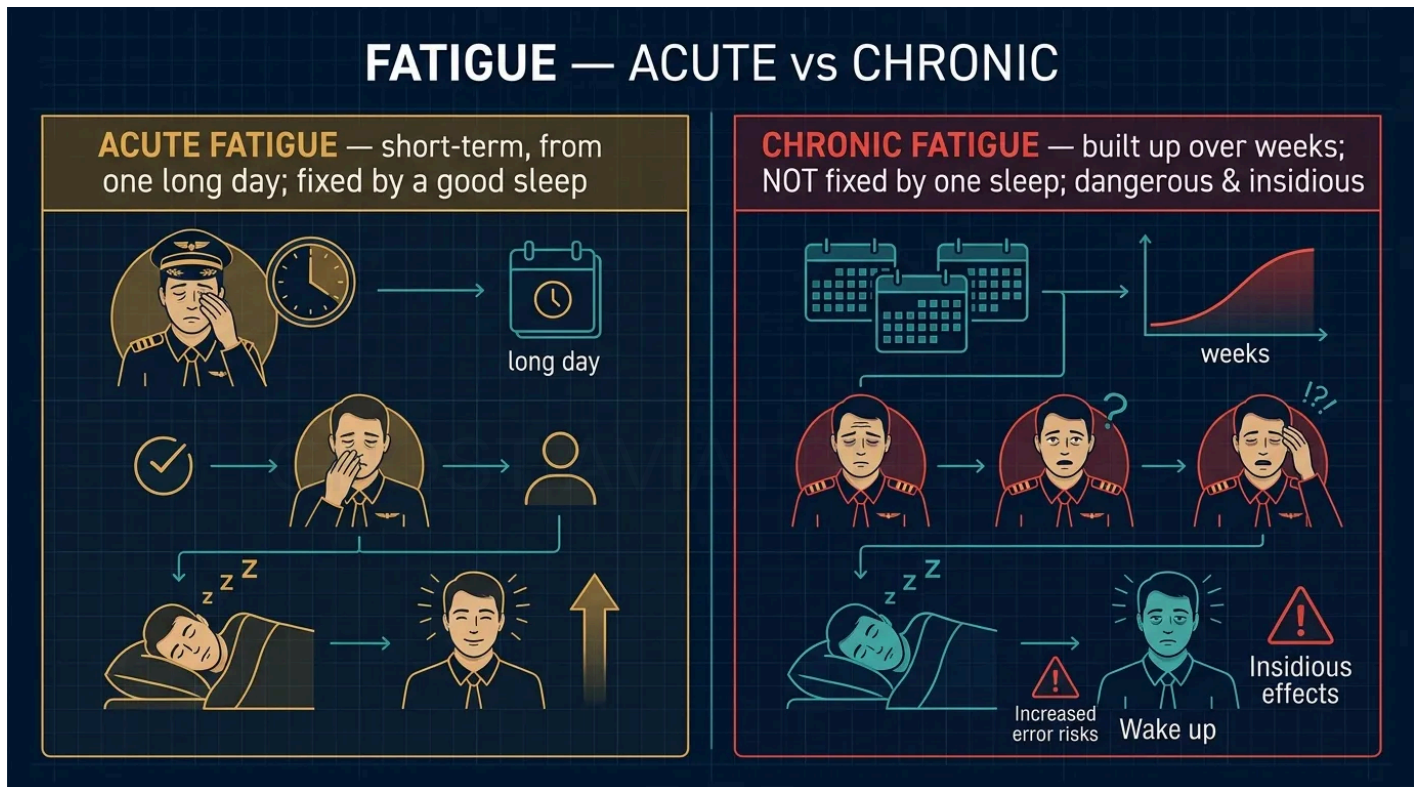


Figure 23.3 — Fatigue: acute fatigue is fixed by rest; chronic fatigue builds over time and is far more dangerous.

Tiredness and fatigue, though related concepts, differ in their long-term physical effect on the body. To deal with normal tiredness it is sufficient to ensure that periods of activity and periods of restful sleep comply with the normal pattern for a person's age and physical condition.

Ordinary tiredness results from normal physical and/or mental exertion over a normal waking period. If a person is tired, *a good night's sleep* is the only requirement for that person to be fit the following morning.

DEFINITION — FATIGUE

Fatigue is a **very deep tiredness due to the cumulative effects of a stressful lifestyle and/or living and working environment.**

- The effects of fatigue can be *insidious*.
- They can creep up slowly on the sufferer.
- The sufferer may be unwilling to recognize or admit that he is suffering from fatigue.
- Tiredness and fatigue can kill, but fatigue is harder to recognize.

Causes of Fatigue

- Long-term ill health, either physical or mental

Join live classes for guided practice and doubt clearing.

- Regular sleep deprivation, for whatever reason
- High levels of stress and/or anxiety over a prolonged period
- A disturbed body cycle (e.g. jet lag, changing work shift patterns)
- Long-term difficulties in personal or work-based relationships
- A stressful living and/or working environment (e.g. high levels of noise, or unreasonable physical or mental demands)

Symptoms of Fatigue

- Memory lapses
- Frequent mistakes in speech and actions
- Rapid changes of mood
- Diminished awareness
- Tiredness
- Lack of coordination

Minimum Self-Help Program

- Accept the fact that you are fatigued
- Eat a balanced diet and healthy food
- Try to take the stress out of your life
- Make sure that you get regular, undisturbed sleep
- Avoid alcohol and caffeine
- Always consult a doctor

22.9 Arousal

Arousal is a major aspect of many learning theories and is closely related to other concepts such as *anxiety, attention, agitation, stress and motivation*.

Arousal Level	Effect
Low Arousal	In cruise, attention can wander; information missed or misinterpreted
Optimum Arousal	Central Decision Maker at its most efficient. Lower for difficult/cognitive tasks; higher for tasks requiring endurance and persistence
High Arousal (Overload)	Real danger of attention becoming narrowed

AROUSAL & PERFORMANCE

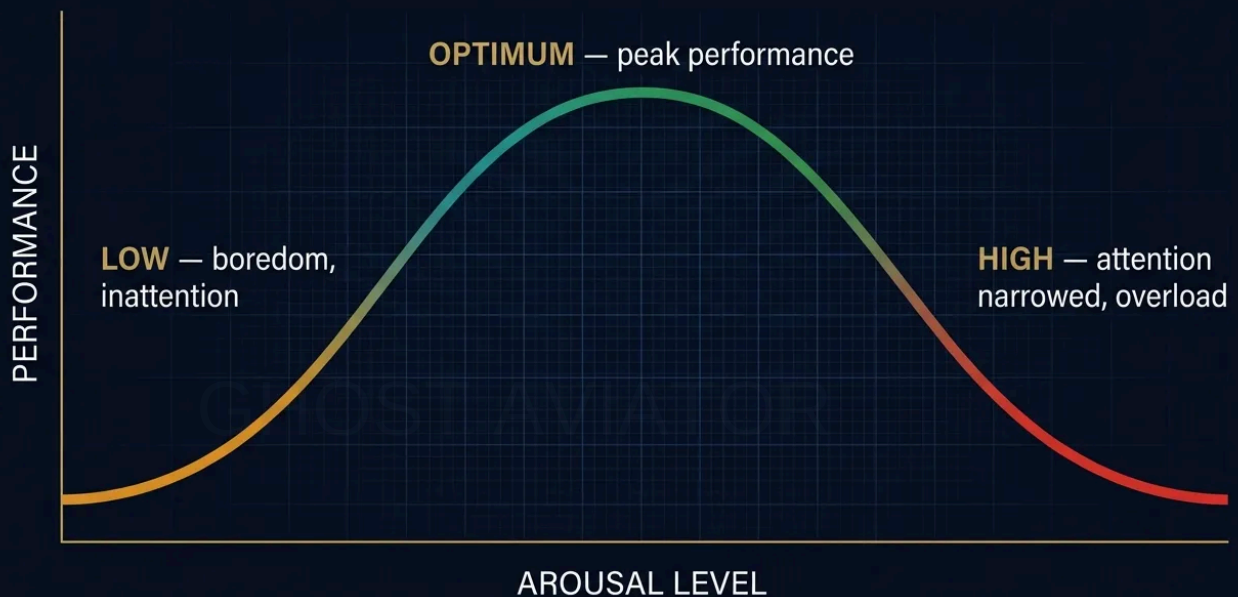


Figure 23.1 — Arousal and performance (Yerkes–Dodson): too little brings boredom, too much narrows attention; performance peaks in the middle.

EXAM TIP — STRESS PROMOTES...

Stress promotes an **increase in physical strength** rather than mental performance. A moderate level of stress may **improve** performance.

✦ END OF CHAPTER 23 ✦