



## The Distortion of Time & Space under Stress

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### Abstract

Increased understanding of the mechanisms by which stress impacts on our performance is essential to successful performance. This paper will briefly examine the explanations for the distortion of time and space under stress.

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**Introduction:** The law enforcement and aviation environment requires individuals to process complex information quickly from multiple sources. The substantial information load that technological advances have placed upon individuals can induce considerable stress and impair performance. It is therefore critical to develop methods to minimize these negative effects. Such an effort requires development of a clear understanding of the effects of stress on performance. This discussion aims to further our understanding by examining the perceptual distortions that occur under stress. Under extreme stress individuals often report a distortion in space or time surrounding the event.

**Distortions of Perception:** One way in which stress impacts performance is through the perceptual distortion of space and time. In an acute stress response or emotional response there is a 'narrowing' of the range of cues individuals extract from the surrounding environment. The stress and/or emotional arousal restrict the use of the range of cues from the environment. This results in restricted attentional capacity and induces changes in the manner in which remaining resources are directed. Specifically, there is a reduction in environmental sampling (information processing), which results in a distortion of perceived space-time.

Under conditions of chronic or acute stress, non-essential stimuli are sacrificed at the expense of more important cues. As attention narrows (i.e. as the number of cues attended to is reduced), performance capacity is preserved by the retention of focus on only the important cues. You have probably experienced this as tunnel vision or even tunnel hearing. Eventually, performance fails as stress increases and even important cues become



excluded. This may be experienced as fixation. Given that extremes of under-load are as stressful as extremes of overload, it is evident that this concept supports the inverted-U discussed in the Human Factors Threat & Error Management Course. Narrowing is a real world phenomenon that is not limited to laboratory conditions. Founded on both data and theory, the indications are that spatial perception is significantly influenced by stress.

**Distortions of Time Perception:** Individuals who experience 'time distortion' under stress report one of two forms of experience. For one group, everything appears as a 'blur' as though events were stacked together almost into one 'moment'. A second pattern has the individual reporting many different events with startling clarity as time itself appears to 'slow down.' Each of these patterns represents effects of time-in-memory that are evident in the memory of the event.

Whether you see the event as 'speeded up' or 'slowed down' depends on your focus of attention at the time. Attention can either be directed toward the actual environment (not the events but a bigger picture) or the internal events (what is actually happening). In emergency situations the focus is usually on the environment (i.e. being personally involved in aircraft emergencies, accidents, police shootings, car accidents, etc. In well planned, rehearsed activities, or in situations where you are the spectator, the focus is usually on the internal events (i.e. a planned SWAT operation, pursuit driving, landing an aircraft, etc.)

When attention is directed toward the environment (the big picture) it induces the perception of 'slow down'. In this case information processing increases dramatically. Since we process more information effectively we have better recall. For such an individual, recalling the incident in memory is characterized by a recognition of the time distortion itself and clarity of recall of many events which, since they cannot be reconciled with common time experience, are reported as being outside the normal run of behavior, e.g., "time seemed to slow down and I remember every little detail."

In contrast, when attention is not directed toward the environment but instead re-directed toward "internal" events (what is actually happening), few if any events are registered. Without sufficient events to fill a period of time, time seems suddenly "speeded up". To the individual recalling such an incident time would appear to have speeded up and everything would have gone past "in a blur".